COMPUTER APPLICATIONS
IN
BANKING & FINANCE

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PROBLEM 1.

Create The Interest Rate Factor Table For Future Value Of $1 In N Periods (F/P, i, N) In Excel Program By Using Following Formula:

$$\text{Future Value (FV)} = P(1+i)^n$$

$$\text{Future Value Interest Rate Factor (FVIF)} = (1+i)^n$$

PROBLEM 2.

Create The Interest Factor Table For Present Value Of $1 In N Periods (F/P, i, N) In Excel Program By Using Following Formula:

$$\text{Present Value (PV)} = FV / (1+i)^n$$

$$\text{Present Value Interest Rate Factor (PVIF)} = FVIF\left(\frac{1}{(1+i)^n}\right)$$

PROBLEM 3.

Create The Interest Factor Table For Present Value Of An Annuity Of $1 In N Periods (P/A, i, N) In Excel Program By Using Following Formula:

$$(P/A, i, n) = \frac{1-(1+i)^{-n}}{i}$$

PROBLEM 4.

Create The Interest Factor Table For Future Value Of An Annuity Of $1 In N Periods (F/A, i, N) In Excel Program By Using Following Formula:

$$(F/A, i, n) = \frac{(1+i)^n - 1}{i}$$

Table 1. Future Value of $ 1 in period N (P/F, i, N)

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.01000	1.02000	1.03000	1.04000	1.05000	1.06000	1.07000	1.08000	1.09000	1.10000
2	1.02010	1.04040	1.06090	1.08160	1.10250	1.12360	1.14490	1.16640	1.18810	1.21000
3	1.03030	1.06121	1.09273	1.12486	1.15763	1.19102	1.22504	1.25971	1.29503	1.33100
4	1.04060	1.08243	1.12551	1.16986	1.21551	1.26248	1.31080	1.36049	1.41158	1.46410
5	1.05101	1.10408	1.15927	1.21665	1.27628	1.33823	1.40255	1.46933	1.53862	1.61051
6	1.06152	1.12616	1.19405	1.26532	1.34010	1.41852	1.50073	1.58687	1.67710	1.77156
7	1.07214	1.14869	1.22987	1.31593	1.40710	1.50363	1.60578	1.71382	1.82804	1.94872
8	1.08286	1.17166	1.26677	1.36857	1.47746	1.59385	1.71819	1.85093	1.99256	2.14359
9	1.09369	1.19509	1.30477	1.42331	1.55133	1.68948	1.83846	1.99900	2.17189	2.35795
10	1.10462	1.21899	1.34392	1.48024	1.62889	1.79085	1.96715	2.15892	2.36736	2.59374
11	1.11567	1.24337	1.38423	1.53945	1.71034	1.89830	2.10485	2.33164	2.58043	2.85312
12	1.12683	1.26824	1.42576	1.60103	1.79586	2.01220	2.25219	2.51817	2.81266	3.13843
13	1.13809	1.29361	1.46853	1.66507	1.88565	2.13293	2.40985	2.71962	3.06580	3.45227
14	1.14947	1.31948	1.51259	1.73168	1.97993	2.26090	2.57853	2.93719	3.34173	3.79750
15	1.16097	1.34587	1.55797	1.80094	2.07893	2.39656	2.75903	3.17217	3.64248	4.17725
16	1.17258	1.37279	1.60471	1.87298	2.18287	2.54035	2.95216	3.42594	3.97031	4.59497
17	1.18430	1.40024	1.65285	1.94790	2.29202	2.69277	3.15882	3.70002	4.32763	5.05447
18	1.19615	1.42825	1.70243	2.02582	2.40662	2.85434	3.37993	3.99602	4.71712	5.55992
19	1.20811	1.45681	1.75351	2.10685	2.52695	3.02560	3.61653	4.31570	5.14166	6.11591
20	1.22019	1.48595	1.80611	2.19112	2.65330	3.20714	3.86968	4.66096	5.60441	6.72750
21	1.23239	1.51567	1.86029	2.27877	2.78596	3.39956	4.14056	5.03383	6.10881	7.40025
22	1.24472	1.54598	1.91610	2.36992	2.92526	3.60354	4.43040	5.43654	6.65860	8.14027
23	1.25716	1.57690	1.97359	2.46472	3.07152	3.81975	4.74053	5.87146	7.25787	8.95430
24	1.26973	1.60844	2.03279	2.56330	3.22510	4.04893	5.07237	6.34118	7.91108	9.84973
25	1.28243	1.64061	2.09378	2.66584	3.38635	4.29187	5.42743	6.84848	8.62308	10.83471
26	1.29526	1.67342	2.15659	2.77247	3.55567	4.54938	5.80735	7.39635	9.39916	11.91818
27	1.30821	1.70689	2.22129	2.88337	3.73346	4.82235	6.21387	7.98806	10.24508	13.10999
28	1.32129	1.74102	2.28793	2.99870	3.92013	5.11169	6.64884	8.62711	11.16714	14.42099
29	1.33450	1.77584	2.35657	3.11865	4.11614	5.41839	7.11426	9.31727	12.17218	15.86309
30	1.34785	1.81136	2.42726	3.24340	4.32194	5.74349	7.61226	10.06266	13.26768	17.44940
31	1.36133	1.84759	2.50008	3.37313	4.53804	6.08810	8.14511	10.86767	14.46177	19.19434
32	1.37494	1.88454	2.57508	3.50806	4.76494	6.45339	8.71527	11.73708	15.76333	21.11378
33	1.38869	1.92223	2.65234	3.64838	5.00319	6.84059	9.32534	12.67605	17.18203	23.22515
34	1.40258	1.96068	2.73191	3.79432	5.25335	7.25103	9.97811	13.69013	18.72841	25.54767
35	1.41660	1.99989	2.81386	3.94609	5.51602	7.68609	10.67658	14.78534	20.41397	28.10244
36	1.43077	2.03989	2.89828	4.10393	5.79182	8.14725	11.42394	15.96817	22.25123	30.91268
37	1.44508	2.08069	2.98523	4.26809	6.08141	8.63609	12.22362	17.24563	24.25384	34.00395
38	1.45953	2.12230	3.07478	4.43881	6.38548	9.15425	13.07927	18.62528	26.43668	37.40434
39	1.47412	2.16474	3.16703	4.61637	6.70475	9.70351	13.99482	20.11530	28.81598	41.14478
40	1.48886	2.20804	3.26204	4.80102	7.03999	10.28572	14.97446	21.72452	31.40942	45.25926

Table 2. Present Value of $ 1 in period N (P/F, i, N)

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593	0.91743	0.90909
2	0.98030	0.96117	0.94260	0.92456	0.90703	0.89000	0.87344	0.85734	0.84168	0.82645
3	0.97059	0.94232	0.91514	0.88900	0.86384	0.83962	0.81630	0.79383	0.77218	0.75131
4	0.96098	0.92385	0.88849	0.85480	0.82270	0.79209	0.76290	0.73503	0.70843	0.68301
5	0.95147	0.90573	0.86261	0.82193	0.78353	0.74726	0.71299	0.68058	0.64993	0.62092
6	0.94205	0.88797	0.83748	0.79031	0.74622	0.70496	0.66634	0.63017	0.59627	0.56447
7	0.93272	0.87056	0.81309	0.75992	0.71068	0.66506	0.62275	0.58349	0.54703	0.51316
8	0.92348	0.85349	0.78941	0.73069	0.67684	0.62741	0.58201	0.54027	0.50187	0.46651
9	0.91434	0.83676	0.76642	0.70259	0.64461	0.59190	0.54393	0.50025	0.46043	0.42410
10	0.90529	0.82035	0.74409	0.67556	0.61391	0.55839	0.50835	0.46319	0.42241	0.38554
11	0.89632	0.80426	0.72242	0.64958	0.58468	0.52679	0.47509	0.42888	0.38753	0.35049
12	0.88745	0.78849	0.70138	0.62460	0.55684	0.49697	0.44401	0.39711	0.35553	0.31863
13	0.87866	0.77303	0.68095	0.60057	0.53032	0.46884	0.41496	0.36770	0.32618	0.28966
14	0.86996	0.75788	0.66112	0.57748	0.50507	0.44230	0.38782	0.34046	0.29925	0.26333
15	0.86135	0.74301	0.64186	0.55526	0.48102	0.41727	0.36245	0.31524	0.27454	0.23939
16	0.85282	0.72845	0.62317	0.53391	0.45811	0.39365	0.33873	0.29189	0.25187	0.21763
17	0.84438	0.71416	0.60502	0.51337	0.43630	0.37136	0.31657	0.27027	0.23107	0.19784
18	0.83602	0.70016	0.58739	0.49363	0.41552	0.35034	0.29586	0.25025	0.21199	0.17986
19	0.82774	0.68643	0.57029	0.47464	0.39573	0.33051	0.27651	0.23171	0.19449	0.16351
20	0.81954	0.67297	0.55368	0.45639	0.37689	0.31180	0.25842	0.21455	0.17843	0.14864
21	0.81143	0.65978	0.53755	0.43883	0.35894	0.29416	0.24151	0.19866	0.16370	0.13513
22	0.80340	0.64684	0.52189	0.42196	0.34185	0.27751	0.22571	0.18394	0.15018	0.12285
23	0.79544	0.63416	0.50669	0.40573	0.32557	0.26180	0.21095	0.17032	0.13778	0.11168
24	0.78757	0.62172	0.49193	0.39012	0.31007	0.24698	0.19715	0.15770	0.12640	0.10153
25	0.77977	0.60953	0.47761	0.37512	0.29530	0.23300	0.18425	0.14602	0.11597	0.09230
26	0.77205	0.59758	0.46369	0.36069	0.28124	0.21981	0.17220	0.13520	0.10639	0.08391
27	0.76440	0.58586	0.45019	0.34682	0.26785	0.20737	0.16093	0.12519	0.09761	0.07628
28	0.75684	0.57437	0.43708	0.33348	0.25509	0.19563	0.15040	0.11591	0.08955	0.06934
29	0.74934	0.56311	0.42435	0.32065	0.24295	0.18456	0.14056	0.10733	0.08215	0.06304
30	0.74192	0.55207	0.41199	0.30832	0.23138	0.17411	0.13137	0.09938	0.07537	0.05731
31	0.73458	0.54125	0.39999	0.29646	0.22036	0.16425	0.12277	0.09202	0.06915	0.05210
32	0.72730	0.53063	0.38834	0.28506	0.20987	0.15496	0.11474	0.08520	0.06344	0.04736
33	0.72010	0.52023	0.37703	0.27409	0.19987	0.14619	0.10723	0.07889	0.05820	0.04306
34	0.71297	0.51003	0.36604	0.26355	0.19035	0.13791	0.10022	0.07305	0.05339	0.03914
35	0.70591	0.50003	0.35538	0.25342	0.18129	0.13011	0.09366	0.06763	0.04899	0.03558
36	0.69892	0.49022	0.34503	0.24367	0.17266	0.12274	0.08754	0.06262	0.04494	0.03235
37	0.69200	0.48061	0.33498	0.23430	0.16444	0.11579	0.08181	0.05799	0.04123	0.02941
38	0.68515	0.47119	0.32523	0.22529	0.15661	0.10924	0.07646	0.05369	0.03783	0.02673
39	0.67837	0.46195	0.31575	0.21662	0.14915	0.10306	0.07146	0.04971	0.03470	0.02430
40	0.67165	0.45289	0.30656	0.20829	0.14205	0.09722	0.06678	0.04603	0.03184	0.02209

Table 3. Present Value of an Annuity of $ 1 per period (P/A, i, n)

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593	0.91743	0.90909
2	1.97040	1.94156	1.91347	1.88609	1.85941	1.83339	1.80802	1.78326	1.75911	1.73554
3	2.94099	2.88388	2.82861	2.77509	2.72325	2.67301	2.62432	2.57710	2.53129	2.48685
4	3.90197	3.80773	3.71710	3.62990	3.54595	3.46511	3.38721	3.31213	3.23972	3.16987
5	4.85343	4.71346	4.57971	4.45182	4.32948	4.21236	4.10020	3.99271	3.88965	3.79079
6	5.79548	5.60143	5.41719	5.24214	5.07569	4.91732	4.76654	4.62288	4.48592	4.35526
7	6.72819	6.47199	6.23028	6.00205	5.78637	5.58238	5.38929	5.20637	5.03295	4.86842
8	7.65168	7.32548	7.01969	6.73274	6.46321	6.20979	5.97130	5.74664	5.53482	5.33493
9	8.56602	8.16224	7.78611	7.43533	7.10782	6.80169	6.51523	6.24689	5.99525	5.75902
10	9.47130	8.98259	8.53020	8.11090	7.72173	7.36009	7.02358	6.71008	6.41766	6.14457
11	10.36763	9.78685	9.25262	8.76048	8.30641	7.88687	7.49867	7.13896	6.80519	6.49506
12	11.25508	10.57534	9.95400	9.38507	8.86325	8.38384	7.94269	7.53608	7.16073	6.81369
13	12.13374	11.34837	10.63496	9.98565	9.39357	8.85268	8.35765	7.90378	7.48690	7.10336
14	13.00370	12.10625	11.29607	10.56312	9.89864	9.29498	8.74547	8.24424	7.78615	7.36669
15	13.86505	12.84926	11.93794	11.11839	10.37966	9.71225	9.10791	8.55948	8.06069	7.60608
16	14.71787	13.57771	12.56110	11.65230	10.83777	10.10590	9.44665	8.85137	8.31256	7.82371
17	15.56225	14.29187	13.16612	12.16567	11.27407	10.47726	9.76322	9.12164	8.54363	8.02155
18	16.39827	14.99203	13.75351	12.65930	11.68959	10.82760	10.05909	9.37189	8.75563	8.20141
19	17.22601	15.67846	14.32380	13.13394	12.08532	11.15812	10.33560	9.60360	8.95011	8.36492
20	18.04555	16.35143	14.87747	13.59033	12.46221	11.46992	10.59401	9.81815	9.12855	8.51356
21	18.85698	17.01121	15.41502	14.02916	12.82115	11.76408	10.83553	10.01680	9.29224	8.64869
22	19.66038	17.65805	15.93692	14.45112	13.16300	12.04158	11.06124	10.20074	9.44243	8.77154
23	20.45582	18.29220	16.44361	14.85684	13.48857	12.30338	11.27219	10.37106	9.58021	8.88322
24	21.24339	18.91393	16.93554	15.24696	13.79864	12.55036	11.46933	10.52876	9.70661	8.98474
25	22.02316	19.52346	17.41315	15.62208	14.09394	12.78336	11.65358	10.67478	9.82258	9.07704
26	22.79520	20.12104	17.87684	15.98277	14.37519	13.00317	11.82578	10.80998	9.92897	9.16095
27	23.55961	20.70690	18.32703	16.32959	14.64303	13.21053	11.98671	10.93516	10.02658	9.23722
28	24.31644	21.28127	18.76411	16.66306	14.89813	13.40616	12.13711	11.05108	10.11613	9.30657
29	25.06579	21.84438	19.18845	16.98371	15.14107	13.59072	12.27767	11.15841	10.19828	9.36961
30	25.80771	22.39646	19.60044	17.29203	15.37245	13.76483	12.40904	11.25778	10.27365	9.42691
31	26.54229	22.93770	20.00043	17.58849	15.59281	13.92909	12.53181	11.34980	10.34280	9.47901
32	27.26959	23.46833	20.38877	17.87355	15.80268	14.08404	12.64656	11.43500	10.40624	9.52638
33	27.98969	23.98856	20.76579	18.14765	16.00255	14.23023	12.75379	11.51389	10.46444	9.56943
34	28.70267	24.49859	21.13184	18.41120	16.19290	14.36814	12.85401	11.58693	10.51784	9.60857
35	29.40858	24.99862	21.48722	18.66461	16.37419	14.49825	12.94767	11.65457	10.56682	9.64416
36	30.10751	25.48884	21.83225	18.90828	16.54685	14.62099	13.03521	11.71719	10.61176	9.67651
37	30.79951	25.96945	22.16724	19.14258	16.71129	14.73678	13.11702	11.77518	10.65299	9.70592
38	31.48466	26.44064	22.49246	19.36786	16.86789	14.84602	13.19347	11.82887	10.69082	9.73265
39	32.16303	26.90259	22.80822	19.58448	17.01704	14.94907	13.26493	11.87858	10.72552	9.75696
40	32.83469	27.35548	23.11477	19.79277	17.15909	15.04630	13.33171	11.92461	10.75736	9.77905

Table 4. Future Value Of An Annuity Of $ 1 per period (F/A, i, n)

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.2598	10.6366	11.0285	11.4359
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	11.9780	12.4876	13.0210	13.5795
10	10.4622	10.9497	11.4639	12.0061	12.5779	13.1808	13.8164	14.4866	15.1929	15.9374
11	11.5668	12.1687	12.8078	13.4864	14.2068	14.9716	15.7836	16.6455	17.5603	18.5312
12	12.6825	13.4121	14.1920	15.0258	15.9171	16.8699	17.8885	18.9771	20.1407	21.3843
13	13.8093	14.6803	15.6178	16.6268	17.7130	18.8821	20.1406	21.4953	22.9534	24.5227
14	14.9474	15.9739	17.0863	18.2919	19.5986	21.0151	22.5505	24.2149	26.0192	27.9750
15	16.0969	17.2934	18.5989	20.0236	21.5786	23.2760	25.1290	27.1521	29.3609	31.7725
16	17.2579	18.6393	20.1569	21.8245	23.6575	25.6725	27.8881	30.3243	33.0034	35.9497
17	18.4304	20.0121	21.7616	23.6975	25.8404	28.2129	30.8402	33.7502	36.9737	40.5447
18	19.6147	21.4123	23.4144	25.6454	28.1324	30.9057	33.9990	37.4502	41.3013	45.5992
19	20.8109	22.8406	25.1169	27.6712	30.5390	33.7600	37.3790	41.4463	46.0185	51.1591
20	22.0190	24.2974	26.8704	29.7781	33.0660	36.7856	40.9955	45.7620	51.1601	57.2750
21	23.2392	25.7833	28.6765	31.9692	35.7193	39.9927	44.8652	50.4229	56.7645	64.0025
22	24.4716	27.2990	30.5368	34.2480	38.5052	43.3923	49.0057	55.4568	62.8733	71.4027
23	25.7163	28.8450	32.4529	36.6179	41.4305	46.9958	53.4361	60.8933	69.5319	79.5430
24	26.9735	30.4219	34.4265	39.0826	44.5020	50.8156	58.1767	66.7648	76.7898	88.4973
25	28.2432	32.0303	36.4593	41.6459	47.7271	54.8645	63.2490	73.1059	84.7009	98.3471
26	29.5256	33.6709	38.5530	44.3117	51.1135	59.1564	68.6765	79.9544	93.3240	109.1818
27	30.8209	35.3443	40.7096	47.0842	54.6691	63.7058	74.4838	87.3508	102.7231	121.0999
28	32.1291	37.0512	42.9309	49.9676	58.4026	68.5281	80.6977	95.3388	112.9682	134.2099
29	33.4504	38.7922	45.2189	52.9663	62.3227	73.6398	87.3465	103.9659	124.1354	148.6309
30	34.7849	40.5681	47.5754	56.0849	66.4388	79.0582	94.4608	113.2832	136.3075	164.4940
31	36.1327	42.3794	50.0027	59.3283	70.7608	84.8017	102.0730	123.3459	149.5752	181.9434
32	37.4941	44.2270	52.5028	62.7015	75.2988	90.8898	110.2182	134.2135	164.0370	201.1378
33	38.8690	46.1116	55.0778	66.2095	80.0638	97.3432	118.9334	145.9506	179.8003	222.2515
34	40.2577	48.0338	57.7302	69.8579	85.0670	104.1838	128.2588	158.6267	196.9823	245.4767
35	41.6603	49.9945	60.4621	73.6522	90.3203	111.4348	138.2369	172.3168	215.7108	271.0244
36	43.0769	51.9944	63.2759	77.5983	95.8363	119.1209	148.9135	187.1021	236.1247	299.1268
37	44.5076	54.0343	66.1742	81.7022	101.6281	127.2681	160.3374	203.0703	258.3759	330.0395
38	45.9527	56.1149	69.1594	85.9703	107.7095	135.9042	172.5610	220.3159	282.6298	364.0434
39	47.4123	58.2372	72.2342	90.4091	114.0950	145.0585	185.6403	238.9412	309.0665	401.4478
40	48.8864	60.4020	75.4013	95.0255	120.7998	154.7620	199.6351	259.0565	337.8824	442.5926

PROBLEM 5.

Automotive Computer Systems (ACS) sells electronic components to automobile manufacturers. Its sales, profits and stock price are highly correlated with the economy as a whole. The current price of ACS stock is $20 per share. Your assessment of the possible dollar returns (stock price + dividends) from owning one share of the stock for 1 year and their associated probabilities are as follows:

$ Return	$14	$18	$20	$22	$24	$26
Probability	0.10	0.10	0.30	0.20	0.20	0.10

a. What are the expected rate of return and standard deviation of the rate of return for an investment of $20 in ACS stock? Ans: E (r) = 5%, σ = 16.28%

$$r = \frac{P_1 - P_0}{P_0} \qquad E(r) = \sum P_i \times r_i \qquad \sigma = \sqrt{\sum P_i(x_i - \bar{x})^2}$$

$$\bar{x} = \textit{Expected}\ \text{Value} = \sum \text{P}_\text{i} \times x_i$$

b. Draw a bar-chart of $ returns and their probabilities.

PROBLEM 6.

You are considering purchasing stock in Massive Manufacturing Company. The current price per share is $40. You have the following expectations regarding the price of the stock 1 year from now (no dividends are expected):

Future Price	$20	$30	$40	$50	$60	$80
Probability	0.10	0.20	0.20	0.20	0.20	0.10

a. What is the price expected to be 1 year from now? Ans: $46

$$E(X) = \Sigma P_i \, . \, X_i$$

b. If the price turns out to be $46, what rate of return will you have earned? Ans: 15%

$$r = \frac{P_1 - P_0}{P_0}$$

c. Determine the probability distribution of the rates of return on this stock. What is the expected rate of return as calculated from this probability distribution?

d. Using the probability distribution of c, calculate the standard deviation of the rate of return on this stock. Ans: 42.13%

PROBLEM 7.

A firm has two investment opportunities open to it, only one of which the firm can accept. The cash outlays required by the two projects and their resulting net incremental cash returns are shown below (in m.$).

End of Year	0	1	2	3	4	5
Project A	(1000)	200	400	300	500	700
Project B	(1000)	250	250	250	700	700

Assume that the riskiness of these projects implies a required rate of return of 15%. Are either of the projects financially acceptable (> $0) or should management reject both?

$$\textit{Net}\text{ Present Value (NPV)} = -C_0 + \sum \frac{Ci}{(1+r)^n}$$

Ans: NPV_A = $307.51, NPV_B = $319.07. Both are acceptable but more preferable one is Project B.

PROBLEM 8.

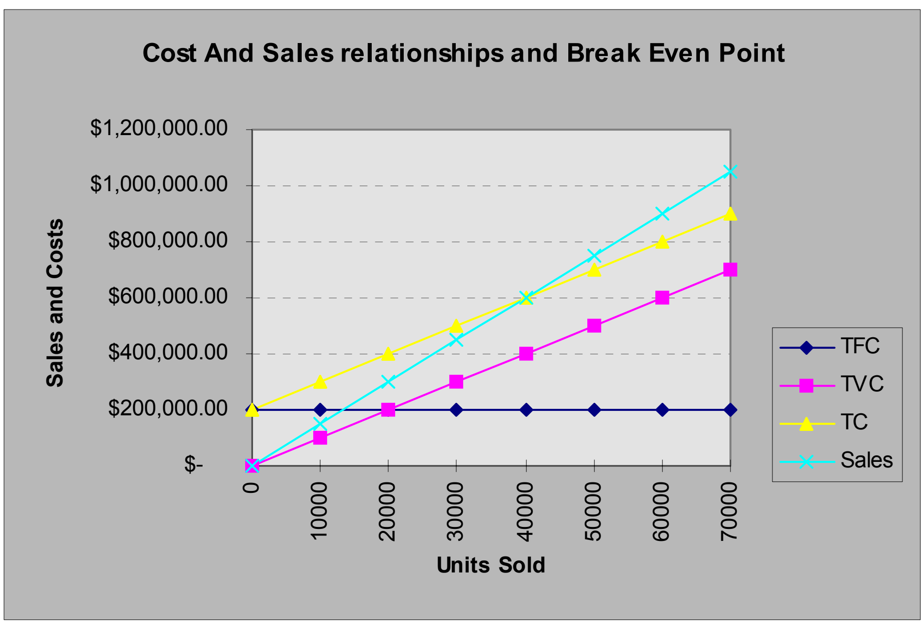
Calculate the annual rates of return for Dynamics International Corporation's (DIC) common stock from the stock price and cash dividend data below.

Year	Year Closing Prices	Annual Cash Dividends	Annual Rate of Return
1980	$ 60.000000	$ 3.000000	
1981	$ 69.000000	$ 3.000000	
1982	$ 100.500000	$ 3.000000	
1983	$ 47.250000	$ 3.000000	
1984	$ 39.525000	$ 3.000000	
1985	$ 72.097500	$ 4.000000	
1986	$ 82.517000	$ 4.000000	
1987	$ 70.265300	$ 4.000000	
1988	$ 80.318360	$ 4.000000	
1989	$ 92.382032	$ 4.000000	
1990	$ 134.573048	$ 4.000000	

$$r = \frac{\text{price change } + \text{ cash dividend}}{\textit{purchase price}}$$

PROBLEM 9.

Units Sold (x)	TFC	TVC	TC	Sales	Pretax Income	Net Income
0	$ 200,000.00	$ -				
10000	$ 200,000.00	$100,000.00				
20000	$ 200,000.00	$200,000.00				
30000	$ 200,000.00	$300,000.00				
40000	$ 200,000.00	$400,000.00				
50000	$ 200,000.00	$500,000.00				
60000	$ 200,000.00	$600,000.00				
70000	$ 200,000.00	$700,000.00				
Unit Selling Price =	$ 15.00					
Unit Variable Cost =	$ 10.00					
Tax =	50.00%					
B.E.P. =	40000					
B.E.P. ($) =	$ 600,000.00					



PROBLEM 10.

Calculate the following income statement by using Excel.

	Pro Forma Income Statement First Quarter			
	JAN	FEB	MAR	YTD
Sales	$ 10.000,00	$ 11.000,00	$ 12.000,00	$ 33.000,00
Variable Expenses				
Material	?	?	?	?
Labor	?	?	?	?
Contribution	?	?	?	?
Fixed Costs				
Depreciation	500,00	500,00	500,00	1.500,00
Advertising	750,00	750,00	750,00	2.250,00
Administration	1.000,00	1.000,00	1.000,00	3.000,00
EBIT	?	?	?	?
Interest Expense	500,00	500,00	500,00	1.500,00
Profit Before Tax	?	?	?	?
Tax (32%)	?	?	?	?
Net Income	?	?	?	?

Formulas Used:

Material = Sales × 0.25
Labor = Sales × 0.30

Contribution = Sales - Variable Expenses

(Variable expenses = Material exp. + Labor exp.)

EBIT (earnings before debt interest and income tax) = Contribution - TFC

Profit before tax = EBIT - Interest expense

Net Income = Profit before tax - tax (32%)

PROBLEM 11.

Find the solutions for income statement, balance sheet and financial ratios of Happy Daze Corporation.

HAPPY DAZE CORPORATION
Income Statement
($000)

Years	1989	1990	1991	1992	1993
REVENUES Cost of Sales	33,000 22,841	35,893 24,407	42,555 29,972	52,108 38,412	62,319 47,719
GROSS MARGIN	?	?	?	?	?
Selling Expenses Administrative Expenses Other	3,214 2,500 640	3,975 2,734 530	4,113 3,041 785	4,675 3,455 905	4,896 3,815 1,054
TOTAL EXPENSES	?	?	?	?	?
OPERATING INCOME	?	?	?	?	?
Interest Expense	482	505	453	466	691
PRE—TAX INCOME	?	?	?	?	?
Income Taxes (35%)	?	?	?	?	?
NET PROFIT	?	?	?	?	?
Earnings per Share (EPS) (Dividend / share)	?	?	?	?	?

- Note: Number of outstanding shares is 33,000. 40% of Net Profit will be Distributed to shareholders.

HAPPY DAZE CORPORATION
Balance Sheet ($000)

Years	1989	1990	1991	1992	1993
			ASSETS		
CURRENT ASSETS:					
Cash	$ 422	1,481	1,281	1,247	1,532
Accounts Receivable	3,626	3,702	4,783	6,377	7,476
Inventories	5,162	4,460	4,872	5,983	6,913
Other Current Assets	725	877	910	988	1,031
TOTAL CURRENT ASSETS:	?	?	?	?	?
FIXED ASSETS:					
Plant & Equipment	5,995	6,100	7,900	10,100	13,421
Accumulated Depreciation: Net Plant	5,995	6,100	7,900	10,100	13,421
Other	7,545	8,170	9,834	12,034	15,555
TOTAL FIXED ASSETS	?	?	?	?	?
TOTAL ASSETS	?	?	?	?	?
			L & O/E		
CURRENT LIABILITIES :					
Accounts Payable	3,654	2,890	3,187	4,671	6,200
Accrued Liabilities	1,020	842	1,234	1,538	1,844
Notes Payable	560	640	0	600	600
Short Term Debt	880	1,031	1,500	378	212
TOTAL CURRENT LIABILITIES	?	?	?	?	?
LONG TERM DEBT					
Notes Payable	640	0	0	1,200	600
Bonds	2,000	2,500	2,500	2,500	4000
Bank Debt	0	0	0	0	800
TOTAL LONG TERM DEBT	?	?	?	?	?
OTHER LIABILITIES:					
Deferred Income Tax	250	150	243	231	307
TOTAL LIABILITIES	?	?	?	?	?
EQUITY:					
Common Stock	1,200	1,200	1,200	1,200	1,200
Capital Surplus	2,150	2,150	2,150	2,150	2,150
Retained Earnings	5,126	7,287	9,666	12,161	14,594
TOTAL EQUITY	?	?	?	?	?
TOTAL LIABILITIES & OWNERS' EQUITY	?	?	?	?	?

HAPPY DAZE CORPORATION

FINANCIAL RATIOS

YEARS	1989	1990	1991	1992	1993	Average
Turnover Ratios						
Total Assets						
Fixed Assets						
Current Assets						
Receivables						
Inventory						
Payables						
Turnover - Days						
Total Assets						
Fixed Assets						
Current Assets						
Receivables						
Inventory						
Payables						
Leverage						
Liability/Assets						
Liability/Equity						
LT Debt/Equity						
Liquidity						
Working Capital						
Current Ratio						
Quick Ratio						
Coverage						
Interest						
Profitability						
Gross Margin						
Operating Income						
Income Before Tax						
Net Profit						
Operating Income/Assets						
Profit/Assets						
Profit/Equity						
Dupont Analysis						
Asset Turnover						
times ROS						
= ROI (ROA)						
times Leverage						
= ROE						

PROBLEM 12. SOURCES AND USES OF FUNDS

Create a Sources and Uses of Funds table for Sparta Hats, Inc. in excel program.

SOURCES AND USES OF FUNDS ANALYSIS FOR SPARTA HATS, INC.				
	DEC.31, 1990	DEC.31, 1991	SOURCE	USE
ASSETS				
Cash	$ 80,00	$ 180,00	?	?
Marketable Securities	70,00	60,00	?	?
Net Accounts Receivable	300,00	380,00	?	?
Inventories	200,00	360,00	?	?
Gross Fixed Assets	700,00	920,00	?	?
Allowance for Depreciation	-250,00	-300,00	?	?
Total Assets	**$ 1.100,00**	**$ 1.600,00**		
LIABILITIES & OWNERS' EQUITY				
Accounts Payable	$ 100,00	$ 130,00	?	?
Notes Payable	200,00	150,00	?	?
Accruals	50,00	70,00	?	?
Long-term debt	200,00	250,00	?	?
Common Stock	100,00	500,00	?	?
Retained Earnings	450,00	500,00	?	?
Total Liabilities&Owners' equity	**$ 1.100,00**	**$ 1.600,00**		
		TOTAL	**?**	**?**

DB

Returns the depreciation of an asset for a specified period using the fixed-declining balance method.

Syntax

DB(cost, salvage, life, period, month)

Cost is the initial cost of the asset.
Salvage is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).
Period is the period for which you want to calculate the depreciation. Period must use the same units as life.

Month is the number of months in the first year. If month is omitted, it is assumed to be 12.

Remarks

The fixed-declining balance method computes depreciation at a fixed rate. DB uses the following formulas to calculate depreciation for a period:
(cost - total depreciation from prior periods) * rate
where:

rate = 1 - ((salvage / cost) ^ (1 / life)), rounded to three decimal places

Depreciation for the first and last periods are special cases. For the first period, DB uses this formula:

cost * rate * month / 12

For the last period, DB uses this formula:
((cost - total depreciation from prior periods) * rate * (12 - month)) / 12

Examples

Suppose a factory purchases a new machine. The machine costs $1,000,000 and has a lifetime of six years. The salvage value of the machine is $100,000. The following examples show depreciation over the life of the machine. The results are rounded to whole numbers.

DB(1000000,100000,6,1,7) equals $186,083
DB(1000000,100000,6,2,7) equals $259,639
DB(1000000,100000,6,3,7) equals $176,814
DB(1000000,100000,6,4,7) equals $120,411
DB(1000000,100000,6,5,7) equals $82,000
DB(1000000,100000,6,6,7) equals $55,842
DB(1000000,100000,6,7,7) equals $15,845

DDB

Returns the depreciation of an asset for a spcified period using the double-declining balance method or some other method you specify.

Syntax

DDB(cost, salvage, life, period, factor)

Cost   is the initial cost of the asset.

Salvage   is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life   is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).

Period   is the period for which you want to calculate the depreciation. Period must use the same units as life.

Factor   is the rate at which the balance declines. If factor is omitted, it is assumed to be 2 (the double-declining balance method).

All five arguments must be positive numbers.

Remarks

The double-declining balance method computes depreciation at an accelerated rate. Depreciation is highest in the first period and decreases in successive periods. DDB uses the following formula to calculate depreciation for a period:

cost - salvage(total depreciation from prior periods) * factor / life

Change factor if you do not want to use the double-declining balance method.

Examples

Suppose a factory purchases a new machine. The machine costs $2400 and has a lifetime of 10 years. The salvage value of the machine is $300. The following examples show depreciation over several periods. The results are rounded to two decimal places.
DDB(2400,300,3650,1) equals $1.32, the first day's depreciation. Microsoft Excel automatically assumes that factor is 2.

DDB(2400,300,120,1,2) equals $40.00, the first month's depreciation.
DDB(2400,300,10,1,2) equals $480.00, the first year's depreciation.

DDB(2400,300,10,2,1.5) equals $306.00, the second year's depreciation using a factor of 1.5 instead of the double-declining balance method.

DDB(2400,300,10,10) equals $22.12, the 10th year's depreciation. Microsoft Excel automatically assumes that factor is 2.

FV

Returns the future value of an investment based on periodic, constant payments and a constant interest rate.

Syntax

FV(rate, nper, pmt, pv, type)

For a more complete description of the arguments in FV and for more information on annuity functions, see PV.

Rate is the interest rate per period.
Nper is the total number of payment periods in an annuity.
Pmt is the payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes.
Pv is the present value, or the lump-sum amount that a series of future payments is worth right now. If pv is omitted, it is assumed to be 0.

Type is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0.

Set type equal to	If payments are due
0	At the end of the period
1	At the beginning of the period

Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use 12%/12 for rate and 4*12 for nper. If you make annual payments on the same loan, use 12% for rate and 4 for nper.

For all the arguments, cash you pay out, such as deposits to savings, is represented by negative numbers; cash you receive, such as dividend checks, is represented by positive numbers.

Examples

FV(0.5%, 10, -200, -500, 1) equals $2581.40
FV(1%, 12, -1000) equals $12,682.50
FV(11%/12, 35, -2000, , 1) equals $82,846.25

Suppose you want to save money for a special project occurring a year from now. You deposit $1000 into a savings account that earns 6 percent annual interest compounded monthly (monthly interest of 6%/12, or 0.5%). You plan to deposit $100 at the beginning of every month for the next 12 months. How much money will be in the account at the end of 12 months?

FV(0.5%, 12, -100, -1000, 1) equals $2301.40

IPMT

Returns the interest payment for a given period for an investment based on periodic, constant payments and a constant interest rate. For a more complete description of the arguments in IPMT and for more information on annuity functions, see PV.

Syntax

IPMT(rate, per, nper, pv, fv, type)

Rate is the interest rate per period.
Per is the period for which you want to find the interest, and must be in the range 1 to nper.
Nper is the total number of payment periods in an annuity.
Pv is the present value, or the lump-sum amount that a series of future payments is worth right now.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0.

Set type equal to	If payments are due
0	At the end of the period
1	At the beginning of the period

Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use 12%/12 for rate and 4*12 for nper. If you make annual payments on the same loan, use 12% for rate and 4 for nper.

For all the arguments, cash you pay out, such as deposits to savings, is represented by negative numbers; cash you receive, such as dividend checks, is represented by positive numbers.

Examples

The following formula calculates the interest due in the first month of a three-year $8000 loan at 10 percent annual interest:

IPMT(0.1/12, 1, 36, 8000) equals -$66.67

The following formula calculates the interest due in the last year of a three-year $8000 loan at 10 percent annual interest, where payments are made yearly:

IPMT(0.1, 3, 3, 8000) equals -$292.45

IRR

Returns the internal rate of return for a series of cash flows represented by the numbers in values. These cash flows do not have to be even, as they would be for an annuity. The internal rate of return is the interest rate received for an investment consisting of payments (negative values) and income (positive values) that occur at regular periods.

Syntax

IRR(values, guess)

Values is an array or a reference to cells that contain numbers for which you want to calculate the internal rate of return.

Values must contain at least one positive value and one negative value to calculate the internal rate of return.

IRR uses the order of values to interpret the order of cash flows. Be sure to enter your payment and income values in the sequence you want.

If an array or reference argument contains text, logical values, or empty cells, those values are ignored.

Guess is a number that you guess is close to the result of IRR.

Microsoft Excel uses an iterative technique for calculating IRR. Starting with guess, IRR cycles through the calculation until the result is accurate within 0.00001 percent. If IRR can't find a result that works after 20 tries, the #NUM! error value is returned.

In most cases you do not need to provide guess for the IRR calculation. If guess is omitted, it is assumed to be 0.1 (10 percent).

If IRR gives the #NUM! error value, or if the result is not close to what you expected, try again with a different value for guess.

Examples

Suppose you want to start a restaurant business. You estimate it will cost $70,000 to start the business and expect to net the following income in the first five years: $12,000, $15,000, $18,000, $21,000, and $26,000. B1:B6 contain the following values: $-70,000, $12,000, $15,000, $18,000, $21,000 and $26,000, respectively.

To calculate the investment's internal rate of return after four years:

IRR(B1:B5) equals -2.12%

To calculate the internal rate of return after five years:

IRR(B1:B6) equals 8.66%

To calculate the internal rate of return after two years, you need to include a guess:
IRR(B1:B3,-10%) equals -44.35%

Remarks

IRR is closely related to NPV, the net present value function. The rate of return calculated by IRR is the interest rate corresponding to a zero net present value. The following macro formula demonstrates how NPV and IRR are related:

NPV(IRR(B1:B6),B1:B6) equals 3.60E-08 (Within the accuracy of the IRR calculation, the value 3.60E-08 is effectively 0.)

MIRR

Returns the modified internal rate of return for a series of periodic cash flows. MIRR considers both the cost of the investment and the interest received on reinvestment of cash.

Syntax

MIRR(values, finance_rate, reinvest_rate)

Values   is an array or a reference to cells that contain numbers. These numbers represent a series of payments (negative values) and income (positive values) occurring at regular periods.

Values must contain at least one positive value and one negative value to calculate the modified internal rate of return. Otherwise, MIRR returns the #DIV/0! error value.

If an array or reference argument contains text, logical values, or empty cells, those values are ignored; however, cells with the value zero are included.

Finance_rate is the interest rate you pay on the money used in the cash flows.
Reinvest_rate is the interest rate you receive on the cash flows as you reinvest them.

Remarks

MIRR uses the order of values to interpret the order of cash flows. Be sure to enter your payment and income values in the sequence you want and with the correct signs (positive values for cash received, negative values for cash paid).

If n is the number of cash flows in values, frate is the finance_rate, and rrate is the reinvest_rate, then the formula for MIRR is:

$$\text{MIRR} = \left[\frac{-NPV\left(rrate, values\left[positive\right]\right).\left(1+rrate\right)^{n}}{NPV\left(frate, values\left[negative\right]\right).\left(1+frate\right)}\right]^{\frac{1}{n-1}} - 1$$

Examples

Suppose you're a commercial fisherman just completing your fifth year of operation. Five years ago, you borrowed $120,000 at 10 percent annual interest to purchase a boat. Your catches have yielded $39,000, $30,000, $21,000, $37,000, and $46,000. During these years you reinvested your profits, earning 12% annually. In a worksheet, your loan amount is entered as -$120,000 in B1, and your five annual profits are entered in B2:B6.
To calculate the investment's modified rate of return after five years:

MIRR(B1:B6, 10%, 12%) equals 12.61%

To calculate the modified rate of return after three years:

MIRR(B1:B4, 10%, 12%) equals -4.80%

To calculate the five-year modified rate of return based on a reinvest_rate of 14%

MIRR(B1:B6, 10%, 14%) equals 13.48%

NPER

Returns the number of periods for an investment based on periodic, constant payments and a constant interest rate.

Syntax

NPER(rate, pmt, pv, fv, type)

For a more complete description of the arguments in NPER and for more information about annuity functions, see PV.

Rate   is the interest rate per period.
Pmt   is the payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes.
Pv   is the present value, or the lump-sum amount that a series of future payments is worth right now.
Fv   is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type   is the number 0 or 1 and indicates when payments are due.

Set type equal to	If payments are due
0 or omitted	At the end of the period
1	At the beginning of the period

Examples

NPER(12%/12, -100, -1000, 10000, 1) equals 60
NPER(1%, -100, -1000, 10000) equals 60
NPER(1%, -100, 1000) equals 11

NPV

Returns the net present value of an investment based on a series of periodic cash flows and a discount rate. The net present value of an investment is today's value of a series of future payments (negative values) and income (positive values).

Syntax

NPV(rate, value1, value2, ...)

Rate   is the rate of discount over the length of one period.
Value1, value2,...   are 1 to 29 arguments representing the payments and income.

Value1, value2,... must be equally spaced in time and occur at the end of each period.

NPV uses the order of value1, value2,... to interpret the order of cash flows. Be sure to enter your payment and income values in the correct sequence.

Arguments that are numbers, empty cells, logical values, or text representations of numbers are counted; arguments that are error values or text that cannot be translated into numbers are ignored.

If an argument is an array or reference, only numbers in that array or reference are counted. Empty cells, logical values, text, or error values in the array or reference are ignored.

Remarks

The NPV investment begins one period before the date of the value1 cash flow and ends with the last cash flow in the list. The NPV calculation is based on future cash flows. If your first cash flow occurs at the beginning of the first period, the first value must be added to the NPV result, not included in the values arguments. For more information, see the examples below.

If n is the number of cash flows in the list of values, the formula for NPV is:

$$\text{NPV} = \sum_{i-1}^{n} \frac{Values_i}{(1+rate)^i}$$

NPV is similar to the PV function (present value). The primary difference between PV and NPV is that PV allows cash flows to begin either at the end or at the beginning of the period. Unlike the variable NPV cash flow values, PV cash flows must be constant throughout the investment. For information about annuities and financial functions, see PV.

NPV is also related to the IRR function (internal rate of return). IRR is the rate for which NPV equals zero: NPV(IRR(...), ...)=0.

Examples

Suppose you're considering an investment in which you pay $10,000 one year from today and receive an annual income of $3000, $4200, and $6800 in the three years that follow. Assuming an annual discount rate of 10 percent, the net present value of this investment is:

NPV(10%, -10000, 3000, 4200, 6800) equals $1188.44

In the preceding example, you include the initial $10,000 cost as one of the values, because the payment occurs at the end of the first period.

Consider an investment that starts at the beginning of the first period. Suppose you're interested in buying a shoe store. The cost of the business is $40,000, and you expect to receive the following income for the first five years of operation: $8000, $9200, $10,000, $12,000, and $14,500. The annual discount rate is 8%. This might represent the rate of inflation or the interest rate of a competing investment.

If the cost and income figures from the shoe store are entered in B1 through B6 respectively, then net present value of the shoe store investment is given by:

NPV(8%, B2:B6)+B1 equals $1922.06

In the preceding example, you don't include the initial $40,000 cost as one of the values, because the payment occurs at the beginning of the first period.

Suppose your shoe store's roof collapses during the sixth year and you assume a loss of $9000 for that year. The net present value of the shoe store investment after six years is given by:

NPV(8%, B2:B6, -9000)+B1 equals -$3749.47

PMT

Returns the periodic payment for an annuity based on constant payments and a constant interest rate.

Syntax

PMT(rate, nper, pv, fv, type)

For a more complete description of the arguments in PMT, see PV.

Rate is the interest rate per period.
Nper is the total number of payment periods in an annuity.
Pv is the present value—the total amount that a series of future payments is worth now.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type is the number 0 or 1 and indicates when payments are due.

Set type equal to	If payments are due
0 or omitted	At the end of the period

1 At the beginning of the period

Remarks

The payment returned by PMT includes principal and interest but no taxes, reserve payments, or fees sometimes associated with annuities.

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use 12%/12 for rate and 4*12 for nper. If you make annual payments on the same loan, use 12% for rate and 4 for nper.

Tip To find the total amount paid over the duration of the annuity, multiply the returned PMT value by nper.

Examples

The following macro formula returns the monthly payment on a $10,000 loan at an annual rate of 8% that you must pay off in 10 months:

PMT(8%/12, 10, 10000) equals -$1037.03

For the same loan, if payments are due at the beginning of the period, the payment is:
PMT(8%/12, 10, 10000, 0), 1) equals -$1030.16

The following macro formula returns the amount someone must pay to you each month if you loan that person $5000 at 12% and want to be paid back in five months:

PMT(12%/12, 5, -5000) equals $1030.20

Suppose you want to save $50,000 in 18 years by saving a constant amount each month. If you assume you'll be able to earn 6% interest on your savings, you can use PMT to determine how much to save each month:

PMT(6%/12, 18*12, 0), 50000) equals -$129.08

If you pay $129.08 into a 6% savings account every month for 18 years, you will have $50,000.

PPMT

Returns the payment on the principal for a given period for an investment based on periodic, constant payments and a constant interest rate.

Syntax

PPMT(rate, per, nper, pv, fv, type)

For a more complete description of the arguments in PPMT, see PV.

Rate   is the interest rate per period.
Per   specifies the period and must be in the range 1 to nper.
Nper   is the total number of payment periods in an annuity.
Pv   is the present value—the total amount that a series of future payments is worth now.
Fv   is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type   is the number 0 or 1 and indicates when payments are due.

Set type equal to	If payments are due
0 or omitted	At the end of the period
1	At the beginning of the period

Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12 percent annual interest, use 12%/12 for rate and 4*12 for nper. If you make annual payments on the same loan, use 12% for rate and 4 for nper.

Examples

The following formula returns the principal payment for the first month of a two-year $2000 loan at 10% annual interest:

PPMT(10%/12, 1, 24, 2000) equals -$75.62

The following function returns the principal payment for the last year of a 10-year $200,000 loan at 8% annual interest:

PPMT(8%, 10, 10, 200000) equals -$27,598.05

PV

Returns the present value of an investment. The present value is the total amount that a series of future payments is worth now. For example, when you borrow money, the loan amount is the present value to the lender.

Syntax

PV(rate, nper, pmt, fv, type)

Rate is the interest rate per period. For example, if you obtain an automobile loan at a 10% annual interest rate and make monthly payments, your interest rate per month is 10%/12, or 0.83%. You would enter 10%/12, or 0.83%, or 0.0083, into the formula as the rate.

Nper is the total number of payment periods in an annuity. For example, if you get a four-year car loan and make monthly payments, your loan has 4*12 (or 48) periods. You would enter 48 into the formula for nper.

Pmt is the payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes. For example, the monthly payments on a $10,000, four-year car loan at 12% are $263.33. You would enter -263.33 into the formula as the pmt.

Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0). For example, if you want to save $50,000 to pay for a special project in 18 years, then $50,000 is the future value. You could then make a conservative guess at an interest rate and determine how much you must save each month.

Type is the number 0 or 1 and indicates when payments are due.

Set type equal to	If payments are due
0 or omitted	At the end of the period
1	At the beginning of the period

Remarks

Make sure that you are consistent about the units you use for specifying rate and nper. If you make monthly payments on a four-year loan at 12% annual interest, use 12%/12 for rate and 4*12 for nper. If you make annual payments on the same loan, use 12% for rate and 4 for nper.

The following functions apply to annuities:

CUMIPMT PPMT
CUMPRINC PV
FV RATE
FVSCHEDULE XIRR
IPMT XNPV
PMT

An annuity is a series of constant cash payments made over a continuous period. For example, a car loan or a mortgage is an annuity. For more information, see the description for each annuity function.

In annuity functions, cash you pay out, such as a deposit to savings, is represented by a negative number; cash you receive, such as a dividend check, is represented by a positive number. For example, a $1000 deposit to the bank would be represented by the argument -1000 if you are the depositor and by the argument 1000 if you are the bank.

Microsoft Excel solves for one financial argument in terms of the others. If rate is not 0, then:

$$PV(1+rate)^{nper} + pmt(1+rate \times type) \times \left[\frac{(1+rate)^{nper} - 1}{rate} \right] + fv = 0$$

If rate is 0, then:
$(pmt \times nper) + pv + fv = 0$

Example

Suppose you're thinking of buying an insurance annuity that pays $500 at the end of every month for the next 20 years. The cost of the annuity is $60,000 and the money paid out will earn 8%. You want to determine whether this would be a good investment. Using the PV function you find that the present value of the annuity is:

PV(0.08/12, 12*20, 500, , 0)) equals -$59,777.15

The result is negative because it represents money that you would pay, an outgoing cash flow. The present value of the annuity ($59,777.15) is less than what you are asked to pay ($60,000). Therefore, you determine this would not be a good investment.

RATE

Returns the interest rate per period of an annuity. RATE is calculated by iteration and can have zero or more solutions. If the successive results of RATE do not converge to within 0.0000001 after 20 iterations, RATE returns the #NUM! error value.

Syntax

RATE(nper, pmt, pv, fv, type, guess)

See PV for a complete description of the arguments nper, pmt, pv, fv, and type.

Nper is the total number of payment periods in an annuity.
Pmt is the payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes.
Pv is the present value—the total amount that a series of future payments is worth now.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type is the number 0 or 1 and indicates when payments are due.

Set type equal to	If payments are due
0 or omitted	At the end of the period
1	At the beginning of the period

Guess is your guess for what the rate will be.

If you omit guess, it is assumed to be 10%.

If RATE does not converge, try different values for guess. RATE usually converges if guess is between 0 and 1.

Remarks

Make sure that you are consistent about the units you use for specifying guess and nper. If you make monthly payments on a four-year loan at 12% annual interest, use 12%/12 for guess and 4*12 for nper. If you make annual payments on the same loan, use 12% for guess and 4 for nper.

Example

To calculate the rate of a four-year $8000 loan with monthly payments of $200:

RATE(48, -200, 8000) equals 0.77%

This is the monthly rate, because the period is monthly. The annual rate is 0.77%*12, which equals 9.24%.

SLN

Returns the straight-line depreciation of an asset for one period.

Syntax

SLN(cost, salvage, life)

Cost   is the initial cost of the asset.

Salvage   is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life   is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).

Example

Suppose you've bought a truck for $30,000 that has a useful life of 10 years and a salvage value of $7500. The depreciation allowance for each year is:
SLN(30000, 7500, 10) equals $2250

SYD

Returns the sum-of-years' digits depreciation of an asset for a specified period.

Syntax

SYD(cost, salvage, life, per)

Cost   is the initial cost of the asset.
Salvage   is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).

Per is the period and must use the same units as life.

Remark

SYD is calculated as follows:

$$\text{SYD} = \frac{(Cost - Salvage)(Life - per + 1).2}{(Life)(Life + 1)}$$

Examples

If you've bought a truck for $30,000 that has a useful life of 10 years and a salvage value of $7500, the yearly depreciation allowance for the first year is:

SYD(30000,7500,10,1) equals $4090.91

The yearly depreciation allowance for the 10th year is:

SYD(30000,7500,10,10) equals $409.09

VDB

Returns the depreciation of an asset for any period you specify, including partial periods, using the double-declining balance method or some other method you specify. VDB stands for variable declining balance.

Syntax

VDB(cost, salvage, life, start_period, end_period, factor, no_switch)

Cost is the initial cost of the asset.
Salvage is the value at the end of the depreciation (sometimes called the salvage value of the asset).

Life is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset).

Start_period is the starting period for which you want to calculate the depreciation. Start_period must use the same units as life.
End_period is the ending period for which you want to calculate the depreciation. End_period must use the same units as life.

Factor is the rate at which the balance declines. If factor is omitted, it is assumed to be 2 (the double-declining balance method). Change factor if you do not want to use the double-declining balance method. For a description of the double-declining balance method, see DDB.

No_switch is a logical value specifying whether to switch to straight-line depreciation when depreciation is greater than the declining balance calculation.

If no_switch is TRUE, Microsoft Excel does not switch to straight-line depreciation even when the depreciation is greater than the declining balance calculation.

If no_switch is FALSE or omitted, Microsoft Excel switches to straight-line depreciation when depreciation is greater than the declining balance calculation.

All arguments except no_switch must be positive numbers.

Examples

Suppose a factory purchases a new machine. The machine costs $2400 and has a lifetime of 10 years. The salvage value of the machine is $300. The following examples show depreciation over several periods. The results are rounded to two decimal places.
VDB(2400, 300, 3650, 0), 1) equals $1.32, the first day's depreciation. Microsoft Excel automatically assumes that factor is 2.

VDB(2400, 300, 120, 0), 1) equals $40.00, the first month's depreciation.
VDB(2400, 300, 10, 0), 1) equals $480.00, the first year's depreciation.

VDB(2400, 300, 120, 6, 18) equals $396.31, the depreciation between the 6th month and the 18th month.

VDB(2400, 300, 120, 6, 18, 1.5) equals $311.81, the depreciation between the 6th month and the 18th month using a factor of 1.5 instead of the double-declining balance method.
Suppose instead that the $2400 machine is purchased in the middle of the first quarter of the fiscal year. The following macro formula determines the amount of depreciation for the first fiscal year that you own the asset, assuming that tax laws limit you to 150% depreciation of the declining balance:

VDB(2400, 300, 10, 0), 0).875, 1.5) equals $315.00