

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN PERDAGANGAN

PEPERIKSAAN AKHIR

SESI JUN 2019

DPB20053: BUSINESS MATHEMATICS

TARIKH : 22 OKTOBER 2019

MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Struktur (4 soalan)
Dokumen sokongan yang disertakan : Jadual PVIF, Jadual PVIFA
dan Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN :

*Bahagian ini mengandungi **EMPAT (4)** soalan struktur. Jawab **SEMUA** soalan.*

QUESTION 1**SOALAN 1**

CLO1
C2

- (a) Simplify the equations below:

Permudahkan persamaan-persamaan di bawah:

i)
$$\frac{5x - 6}{2} = 4(x + 3)$$

[5 marks]

[5 markah]

ii)
$$\begin{aligned} 3x + y &= 2 \\ x - 3y &= 14 \end{aligned}$$

[5 marks]

[5 markah]

CLO1
C2

- (b) Meeira Co Ltd manufactures product X for the Malaysian market. The cost incurred by the company are as follows:

Syarikat Meeira Ltd mengeluarkan keluaran X untuk pasaran di Malaysia. Kos yang terlibat bagi syarikat adalah seperti berikut:

Raw material per unit (<i>Bahan mentah per unit</i>)	RM 5
Labour cost per unit (<i>Kos buruh per unit</i>)	RM 4
Packaging cost per unit (<i>Kos pembungkusan per unit</i>)	RM 3
Rental of premises (<i>Sewaan bangunan</i>)	RM5 000
Administrarion expenses (<i>Belanja pentadbiran</i>)	RM3 000
Marketing expenses (<i>Belanja pemasaran</i>)	RM1 000

The selling price for product X is RM16. Current capacity is 3000 units of product X per year.

Harga jualan utk keluaran X ialah RM16. Kapasiti semasa adalah 3000 unit keluaran X setahun.

Convert information above to identify:

Tukarkan maklumat di atas untuk mengenalpasti:

- i) Break Even Point (BEP) in unit and sales.

Titik pulang modal (TPM) dalam unit dan jualan.

[5 marks]

[5 markah]

- ii) Contribution margin and the contribution margin ratio.

Margin sumbangan dan nisbah margin sumbangan.

[5 marks]

[5 markah]

- iii) Profit that company can earn if selling price increase by 10%.

Keuntungan yang akan diperolehi oleh syarikat jika harga jualan meningkat sebanyak 10%.

[5 marks]

[5 markah]

QUESTION 2**SOALAN 2**CLO1
C1

- (a) Identify the first derivative of the functions below:

Kenalpasti pembezaan pertama bagi fungsi-fungsi di bawah:

i) $y(x) = 4x(x^3 - 5x + 90)$

[5 marks]

[5 markah]

ii) $g(x) = \frac{2x^4 - 3x^2}{5x}$

[5 marks]

[5 markah]

CLO1
C2

- (b) Belinda Sdn Bhd is considering replacing a hand-operated machine with fully automated machine in order to increase company's profit. They have two choices, machine AA or machine BB. Each machine has an estimated useful life for 5 years. Cash flows for machines are as follows :

Belinda Sdn Bhd sedang mempertimbangkan menggantikan mesin menggunakan tangan dengan mesin sepenuh automatik bagi tujuan meningkatkan keuntungan syarikat. Setiap mesin dijangkakan mempunyai jangka hayat selama 5 tahun. Aliran tunai mesin-mesin adalah seperti berikut :

YEAR <i>Tahun</i>	MACHINE AA <i>Mesin AA</i>	MACHINE BB <i>Mesin BB</i>
0	(150 000)	(170 000)
1	45 000	-8 000
2	45 000	60 000
3	45 000	89 000
4	45 000	72 000
5	45 000	67 000

The scrap value for machine AA is RM1,500. Assume the cost of capital is 9%.
Nilai sisa untuk mesin AA ialah RM1,500. Andaian kos modal ialah 9%.

From the information above, compare the payback period for both machine.
Daripada maklumat di atas, bandingkan tempoh bayaran balik bagi kedua-dua mesin.

[5 marks]

[5 markah]

(c) By referring to question in (b), interpret :

Berdasarkan kepada soalan b), terjemahkan:

i) Average Rate of Return (ARR) for both machine.

Kadar Pulangan Purata (KPP) bagi kedua-dua mesin.

[4 marks]

[4 markah]

ii) Net Present Value (NPV) for both machine.

Nilai Kini Bersih (NKB) bagi kedua-dua mesin.

[4 marks]

[4 markah]

iii) Which machine should be selected? State your reason.

Mesin manakah yang perlu dipilih? Nyatakan alasan anda.

[2 marks]

[2 markah]

QUESTION 3**SOALAN 3**CLO2
C2

- (a) Nornie plans to replace her old car with new one at cost RM85 000. She needs to pay the deposit for RM5 000 and the remaining balance will be financed by Marybank at an interest rate of 6.5% per annum. The loan period is 7 years. Interpret:

Nornie bercadang untuk menukarkan kereta lama kepada kereta baru yang berharga RM85 000. Beliau perlu membayar deposit sejumlah RM5 000 dan bakinya akan di biayai oleh Marybank pada kadar faedah 6.5 % setahun. Tempoh pinjaman ialah 7 tahun. Terjemahkan:

- i) Total interest charged by the bank.

Jumlah faedah yang dikenakan oleh bank.

[5 marks]

[5 markah]

- ii) Total monthly payment to be made by Nornie.

Jumlah bayaran bulanan yang perlu dibuat oleh Nornie

[5 marks]

[5 markah]

CLO2
C3

- (b) Kamal Afdi had deposited RM9 000 into a saving account on 15th December 2017 that pays 8% simple interest per annum. On 30th August 2018 he withdrew RM2 500 from the account.

Kamal Afdi telah mendeposit RM9 000 di dalam akaun simpanan pada 15 December 2017 yang membayar faedah mudah sebanyak 8% setahun. Pada 30 Ogos beliau telah mengeluarkan sebanyak RM2 500 dari akaun.

- i) Calculate the exact time and approximate time from the date he deposited the money until the date he withdrew his saving.

Kirakan masa tepat dan masa anggaran dari tarikh dia mendepositikan duit hingga ke tarikh dia mengeluarkan duit.

[5 marks]

[5 markah]

- ii) Calculate the amount received on the date he withdrew his saving by using Banker's Rule

Kirakan jumlah yang diterima pada tarikh dia mengeluarkan duit dengan menggunakan Aturan Bank.

[5 marks]

[5 markah]

- iii) Calculate the total amount in the account as at 15 December 2018. Use Banker's Rule.

Kirakan jumlah wang di dalam akaun pada 15 Disember 2018. Gunakan Aturan Bank.

[5 marks]

[5 markah]

QUESTION 4**SOALAN 4**

Pro-Mas Cold Storage has three (3) distributors located in Kuantan, Kuala Kedah and Kuala Terengganu. Each distributor processes and distributes fresh fish to four (4) hypermarkets located in Gombak, Johor Bharu, Ipoh and Seremban.

Pro-Mas Cold Storage mempunyai tiga (3) pengedar yang terletak di Kuantan, Kuala Kedah dan Kuala Terengganu. Setiap pengedar memproses dan mengedarkan ikan segar di empat (4) pasaraya yang terletak di Gombak, Johor Bharu, Ipoh dan Seremban.

Weekly demands for fresh fish are recorded as follows:

Permintaan mingguan bagi ikan segar direkodkan seperti berikut:

Town	Demands (Total boxes)
Gombak	30
Johor Bharu	50
Ipoh	65
Seremban	55

Weekly supplies for fresh fish are as follows:

Penawaran mingguan bagi ikan segar adalah seperti berikut:

Distributor	Supplies (Total boxes)
Kuantan	100
Kuala Kedah	40
Kuala Terengganu	60

Transportation costs (RM) for each box from distributors to hypermarket are presented in the following table:

Kos pengangkutan (RM) bagi setiap kotak daripada pengedar ke pasaraya adalah seperti di dalam jadual berikut:

Distributors / Pengekar	Hypermarket / Pasaraya			
	Gombak	Johor Bharu	Ipoh	Seremban
Ipoh	8	12	16	14
Port Dickson	25	35	13	18
Johor Bharu	18	22	30	20

You are required to:

Anda dikehendaki untuk:

CLO2
C1

- (a) Complete the matrix for the transportation table.

Penuhkan jadual matriks pengangkutan.

[5 marks]

[5 markah]

CLO2
C2

- (b) Using Minimum Cost method, you are required to report:

Dengan menggunakan kaedah Kos Minima, anda dikehendaki melaporkan:

- i) units that need to be allocated to each destination.

unit yang perlu diagihkan ke setiap destinasi.

[5 marks]

[5 markah]

- ii) total transportation cost.

jumlah kos pengangkutan.

[5 marks]

[5 markah]

CLO2
C3

- (c) Calculate the optimal transportation cost by using the Stepping Stone Method.

Kirakan kos pengangkutan yang paling optima dengan menggunakan Kaedah Batu Loncatan.

[10 marks]

[10 markah]

SOALAN TAMAT

Table A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at k Percent for n Periods: $PVIFA = [1 - 1/(1 + k)^n] / k$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278	1.4568	1.4400	1.3609
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065	1.9813	1.9520	1.8161
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887	2.4043	2.3616	2.1662
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906	2.7454	2.6893	2.4356
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255	3.0205	2.9514	2.6427
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046	3.2423	3.1611	2.8021
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372	3.4212	3.3289	2.9247
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310	3.5655	3.4631	3.0190
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925	3.6819	3.5705	3.0915
11	10.368	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271	3.7757	3.6564	3.1473
12	11.255	10.575	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392	3.8514	3.7251	3.1903
13	12.134	11.348	10.635	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327	3.9124	3.7801	3.2233
14	13.004	12.106	11.296	10.563	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106	3.9616	3.8241	3.2487
15	13.865	12.849	11.938	11.118	10.380	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755	4.0013	3.8593	3.2682
16	14.718	13.578	12.561	11.652	10.838	10.106	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296	4.0333	3.8874	3.2832
17	15.562	14.292	13.166	12.166	11.274	10.477	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746	4.0591	3.9099	3.2948
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122	4.0799	3.9279	3.3037
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435	4.0967	3.9424	3.3105
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696	4.1103	3.9539	3.3158
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913	4.1212	3.9631	3.3198
22	19.660	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094	4.1300	3.9705	3.3230
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245	4.1371	3.9764	3.3254
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371	4.1428	3.9811	3.3272
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476	4.1474	3.9849	3.3286
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	6.1772	4.9789	4.1601	3.9950	3.3321
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.6442	8.8552	8.1755	7.5856	7.0700	6.6166	6.2153	4.9915	4.1644	3.9984	3.3330
36	30.108	25.489	21.832	18.908	16.547	14.621	13.035	11.717	10.612	9.6765	8.8786	8.1924	7.5979	7.0790	6.6231	6.2201	4.9929	4.1649	3.9987	3.3331
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.7791	8.9511	8.2438	7.6344	7.1050	6.6418	6.2335	4.9966	4.1659	3.9995	3.3332
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.9148	9.0417	8.3045	7.6752	7.1327	6.6605	6.2463	4.9995	4.1666	3.9999	3.3333

Table A-3 Present Value Interest Factors for One Dollar Discounted at k Percent for n Periods: $PVIF_{k,n} = 1 / (1 + k)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944	0.6504	0.6400	0.5917
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787	0.5245	0.5120	0.4552
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823	0.4230	0.4096	0.3501
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019	0.3411	0.3277	0.2693
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349	0.2751	0.2621	0.2072
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791	0.2218	0.2097	0.1594
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326	0.1789	0.1678	0.1226
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938	0.1443	0.1342	0.0943
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615	0.1164	0.1074	0.0725
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346	0.0938	0.0859	0.0558
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122	0.0757	0.0687	0.0429
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935	0.0610	0.0550	0.0330
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779	0.0492	0.0440	0.0254
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649	0.0397	0.0352	0.0195
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541	0.0320	0.0281	0.0150
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451	0.0258	0.0225	0.0116
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376	0.0208	0.0180	0.0089
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313	0.0168	0.0144	0.0068
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261	0.0135	0.0115	0.0053
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217	0.0109	0.0092	0.0040
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181	0.0088	0.0074	0.0031
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151	0.0071	0.0059	0.0024
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126	0.0057	0.0047	0.0018
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105	0.0046	0.0038	0.0014
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0116	0.0042	0.0016	0.0012	*
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0676	0.0490	0.0356	0.0259	0.0189	0.0139	0.0102	0.0075	0.0055	0.0017	0.0005	*	*
36	0.6989	0.4902	0.3450	0.2437	0.1727	0.1227	0.0875	0.0626	0.0449	0.0323	0.0234	0.0169	0.0123	0.0089	0.0065	0.0048	0.0014	*	*	*
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460	0.0318	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026	0.0007	*	*	*
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006	*	*	*	*

FORMULA BUSINESS MATHEMATIC

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$P = pQ - VCQ - FC$$

$$P = TR - TC$$

$$TC = VCQ + FC$$

$$TR = pQ$$

$$TVC = VCQ$$

$$BEP(Q) = \frac{FC}{p - VC}$$

$$BEP(RM) = BEP(Q) \times p$$

$$CM = p - VC$$

$$CMR = \frac{p - VC}{p} \times 100$$

$$\frac{dy}{dx} = nx^{n-1}$$

$$\frac{dy}{dx} = nx^{n-1} + 0$$

$$\frac{dy}{dx} = anx^{n-1}$$

$$\frac{dy}{dx} = anx^{n-1} + bmx^{m-1}$$

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$I = Prt$$

$$I = IP - CP$$

$$I = \left(\frac{Pr+Yr}{2} \right) t \quad \text{or} \quad I = \frac{Pr(t+1)}{2}$$

$$Y = \frac{P}{t}$$

$$DP = \text{Rate} (\%) \times CP$$

$$P = CP - DP + \text{other payments}$$

$$S = P + I$$

$$S = P(1 + rt)$$

$$D = Sdt$$

$$H = S - D$$

$$MP = \frac{S}{n}$$

$$IP = DP + (MP \times n) @ DP + S @ DP + P + I$$

$$R = \frac{\sum n}{\sum N} \times I \quad \text{and} \quad \sum n = \left(\frac{n+1}{2} \right) n, \quad \sum N = \left(\frac{N+1}{2} \right) N$$

$$EP = (n \times MP) - R$$

$$S = P \left(1 + \frac{i}{m} \right)^{n.m}$$

$$P = \frac{S}{\left(1 + \frac{i}{m} \right)^{n.m}}$$

$$P = R \left(\frac{1 - \left(1 + \frac{i}{m} \right)^{-n.m}}{\frac{i}{m}} \right) \quad \text{and} \quad R = \frac{P \left(\frac{i}{m} \right)}{1 - \left(1 + \frac{i}{m} \right)^{-n.m}}$$

$$S = R \left(\frac{\left(1 + \frac{i}{m} \right)^{n.m} - 1}{\frac{i}{m}} \right) \quad \text{and} \quad R = \frac{S \left(\frac{i}{m} \right)}{\left(1 + \frac{i}{m} \right)^{n.m} - 1}$$

$$PP = \frac{IO}{ACF}$$

$$PP = T + \frac{IO - \sum CF_T}{CF_{T+1}}$$

$$ARR = \frac{\text{Average CF} - \text{Dep.}}{IO} \times 100$$

$$NPV = ACF(PVIFA, k\%, n) - IO$$

$$PI = \frac{TPV}{IO}$$