

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

- | | | | |
|----|---|----|---|
| 1 | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ | 18 | Isi padu kisaran
<i>Volume of revolution</i>
$= \int_a^b \pi y^2 dx$ atau (or)
$= \int_a^b \pi x^2 dy$ |
| 2 | $a^m \times a^n = a^{m+n}$ | | |
| 3 | $a^m \div a^n = a^{m-n}$ | | |
| 4 | $(a^m)^n = a^{mn}$ | | |
| 5 | $\log_a mn = \log_a m + \log_a n$ | 19 | $I = \frac{Q_1}{Q_0} \times 100$ |
| 6 | $\log_a \frac{m}{n} = \log_a m - \log_a n$ | 20 | $\bar{I} = \frac{\sum I_i W_i}{\sum W_i}$ |
| 7 | $\log_a m^n = n \log_a m$ | 21 | ${}^n P_r = \frac{n!}{(n-r)!}$ |
| 8 | $\log_a b = \frac{\log_c b}{\log_c a}$ | 22 | ${}^n C_r = \frac{n!}{(n-r)!r!}$ |
| 9 | $T_n = a + (n-1)d$ | 23 | $P(X=r) = {}^n C_r p^r q^{n-r}, p+q=1$ |
| 10 | $S_n = \frac{n}{2} [2a + (n-1)d]$ | 24 | Min / Mean, $\mu = np$ |
| 11 | $T_n = ar^{n-1}$ | 25 | $\sigma = \sqrt{npq}$ |
| 12 | $S_n = \frac{a(1-r^n)}{1-r} = \frac{a(r^n-1)}{r-1}, r \neq 1$ | 26 | $z = \frac{X-\mu}{\sigma}$ |
| 13 | $S_\infty = \frac{a}{1-r}, r < 1$ | 27 | Panjang lengkok, $s = j\theta$
<i>Arc length, $s = r\theta$</i> |
| 14 | $y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$ | 28 | Luas sektor, $L = \frac{1}{2} j^2 \theta$
<i>Area of sector, $A = \frac{1}{2} r^2 \theta$</i> |
| 15 | $y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$ | 29 | $\sin^2 A + \cos^2 A = 1$
$\sin^2 A + \cos^2 A = 1$ |
| 16 | $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$ | 30 | $\sec^2 A = 1 + \tan^2 A$
$\sec^2 A = 1 + \tan^2 A$ |
| 17 | Luas di bawah lengkung
<i>Area under a curve</i>
$= \int_a^b y dx$ atau (or)
$= \int_a^b x dy$ | 31 | $\operatorname{cosec}^2 A = 1 + \cot^2 A$
$\operatorname{cosec}^2 A = 1 + \cot^2 A$ |

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- 32 $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \cos A$
- 33 $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
 $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
- 34 $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$
- 35 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
- 36 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
- 37 $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$
- 38 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- 39 $a^2 = b^2 + c^2 - 2bc \cos A$
 $a^2 = b^2 + c^2 - 2bc \cos A$
- 40 Luas segi tiga / *Area of triangle*
 $= \frac{1}{2} ab \sin C$
- 41 Titik yang membahagi suatu tembereng garis
A point dividing a segment of a line
 $(x, y) = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$
- 42 Luas segi tiga / *Area of triangle*
 $= \frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - ((x_2 y_1 + x_3 y_2 + x_1 y_3))|$
- 43 $|\underline{r}| = \sqrt{x^2 + y^2}$
- 44 $\hat{\underline{r}} = \frac{x\underline{i} + y\underline{j}}{\sqrt{x^2 + y^2}}$

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Bahagian A / Section A

[64 markah / marks]

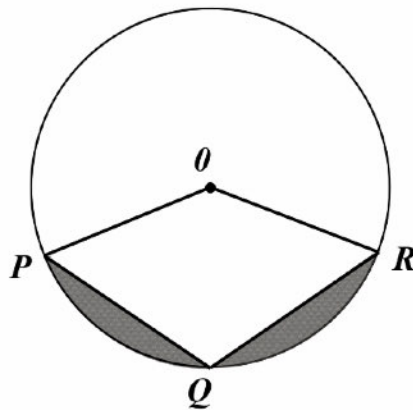
Jawab **semua** soalan / Answer **all** questions.

- 1** Rajah 1 menunjukkan bulatan yang berpusat di O dengan jejari 8 cm. OPQR adalah sebuah rombus dengan P, Q dan R berada pada lilitan bulatan tersebut.

[Guna $\pi = 3.142$]

Diagram 1 shows a circle with centre O with the radius of 8 cm. OPQR is a rhombus where P, Q and R lying on the circumference of the circle.

[Use $\pi = 3.142$]



Rajah 1 / Diagram 1

Kira / Calculate

- (a) $\angle POR$ dalam radian,
 $\angle POR$ in radians,

[3 markah / marks]

- (b) perimeter, dalam cm, bagi kawasan berlorek.
 the perimeter, in cm, of the shaded segments.

[3 markah / marks]

Jawapan / *Answer* :

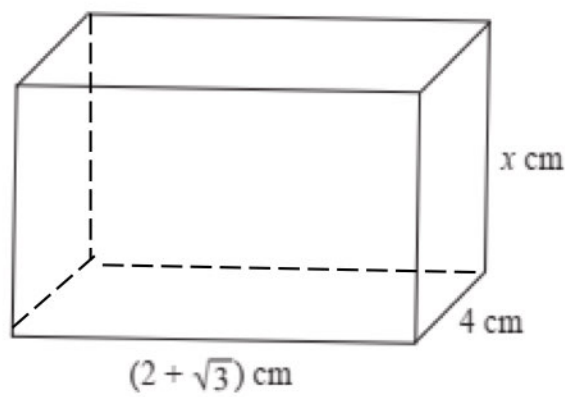
- 2 (a) Tunjukkan bahawa $3^{x+1} + 3^{x+2} + 3^{x+2} - 3^x$ boleh dibahagi tepat dengan 20 bagi semua integer positif x .

Show that $3^{x+1} + 3^{x+2} + 3^{x+2} - 3^x$ is divisible by 20 for all positive integer x .

[2 markah / marks]

- (b) Rajah 2(b) di bawah menunjukkan sebuah kuboid.

Diagram 2(b) below shows a cuboid.



Rajah 2(b) / Diagram 2(b)

Jika isipadu kuboid itu 20 cm^3 , cari nilai x dalam sebutan $a + \sqrt{b}$.

If the volume of the cuboid is 20 cm^3 , find the value of x in terms of $a + \sqrt{b}$.

[3 markah / marks]

Jawapan / Answer :

- 3 Fadzli melaburkan RM 49 000 ke dalam tiga akaun bank yang berlainan iaitu akaun A, B dan C. Pada akhir tahun, dia mendapat faedah pelaburan sebanyak RM 2600. Kadar faedah bagi akaun A, B dan C masing-masing ialah 4 %, 5.5% dan 6%. Diberi nilai wang yang dilabur dalam akaun A ialah empat kali ganda nilai wang yang dilabur dalam akaun B. Hitung jumlah wang yang di labur oleh Fadzli bagi setiap akaun.

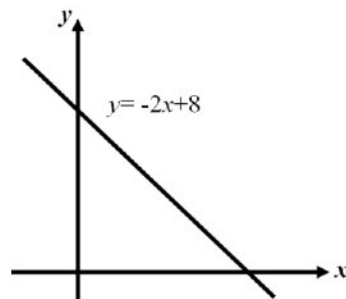
Fadzli invested RM 49 000 into three different bank accounts: A, B and C. At the end of the year, he earned a total interest of RM 2600. The interest rates for account A, B and C are 4%, 5.5% and 6% respectively. Given that the amount invested in account A is four times the amount invested in account B. Calculate the amount of money invested in each account.

[8 markah / marks]

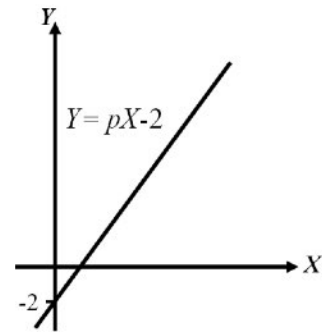
Jawapan / Answer :



- 4 (a) Rajah 4(a) menunjukkan graf bagi $y = -2x + 8$ manakala Rajah 4(b) menunjukkan graf $Y = pX - 2$ yang diperolehi daripada graf 4(a).
Diagram 4(a) shows the graph $y = -2x + 8$ while Diagram 4(b) shows the graph $Y = pX - 2$ obtained from the graph of 4(a).



Rajah 4(a) / Diagram 4(a)



Rajah 4(b) / Diagram 4(b)

- (a) Ungkapkan Y dan X dalam sebutan x dan/atau y
Express Y or X in term of x and/or y

[3 markah / marks]

- (b) Cari nilai bagi p .
Find the value of p .

[1 markah / mark]

Jawapan / Answer :

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- 5 Tunjukkan lengkung $y = x^3 - 3x + 5$ mempunyai titik minimum pada titik (1, 3). Seterusnya, cari koordinat titik maksimum lengkung tersebut.
*Show that the curve $y = x^3 - 3x + 5$ has a minimum point at the point (1, 3).
Hence, find the coordinates of the maximum point of the curve.*

[6 markah / marks]

Jawapan / Answer :

- 6 Diberi $\int_0^3 f(x) dx = 3$ dan $\int_0^3 g(x) dx = 10$, cari
Given $\int_0^3 f(x) dx = 3$ and $\int_0^3 g(x) dx = 10$, find

(a) $\int_0^3 [4f(x) - 3g(x)] dx$

[2 markah / marks]

- (b) nilai k , jika $\int_0^3 [3g(x) - f(x)] dx = \int_0^k 3x^2 dx$
value of k , if $\int_0^3 [3g(x) - f(x)] dx = \int_0^k 3x^2 dx$

[3 markah / marks]

Jawapan / Answer :

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- 7 Markah ujian Matematik Tambahan pelajar tingkatan 5 adalah bertaburan normal dengan min 70 dan sisihan piawai 8.

Cari kebarangkalian bahawa seorang pelajar memperoleh markah antara 65 hingga 82.

The Additional Mathematics test scores of Form 5 students are normally distributed with a mean of 70 and a standard deviation of 8.

Find the probability that a student obtains a score between 65 and 82.

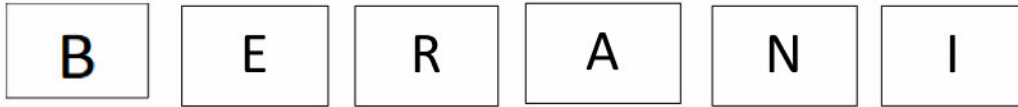
[5 markah / marks]

Jawapan / Answer :



- 8 Rajah 8 menunjukkan enam keping kad huruf.

Diagram 8 shows six letter cards.



Rajah 8 / Diagram 8

- (a) Hitung bilangan cara menyusun semua huruf itu tanpa ulangan jika
Calculate the number of ways to arrange all the letters without repetition if

- (i) tiada syarat
there are no conditions,
- (ii) susunan bermula dan berakhir dengan huruf konsonan.
the arrangement begins and end with a consonant.

[4 markah / marks]

- (b) Cari bilangan cara menyusun satu kod yang mempunyai 3 huruf.
Find the number of ways to arrange a code that have 3 letters.

[2 markah / marks]

Jawapan / Answer :

- 9 Aqeef memukul dua biji bola golf keluar dari taman. Vektor sesaran, dalam m, untuk bola golf yang pertama dan bola golf yang kedua ialah $b_1 = 100\mathbf{i} + 10\mathbf{j}$ dan $b_2 = 90\mathbf{i} - 20\mathbf{j}$ masing-masing. Berapakah jarak yang dilalui oleh bola pertama melebihi yang kedua?

Aqeef hits two golf balls out of the park. The displacement vector, in meter of the first golf ball and the second golf ball are $b_1 = 100\mathbf{i} + 10\mathbf{j}$ and $b_2 = 90\mathbf{i} - 20\mathbf{j}$ respectively. How much farther did the first ball travel than the second?

[Tips: Jarak dilalui adalah bersamaan dengan magnitud untuk vektor sesaran]

[Hint: Distance travelled is equals to magnitude of displacement vector]

[3 markah / marks]

Jawapan / Answer :

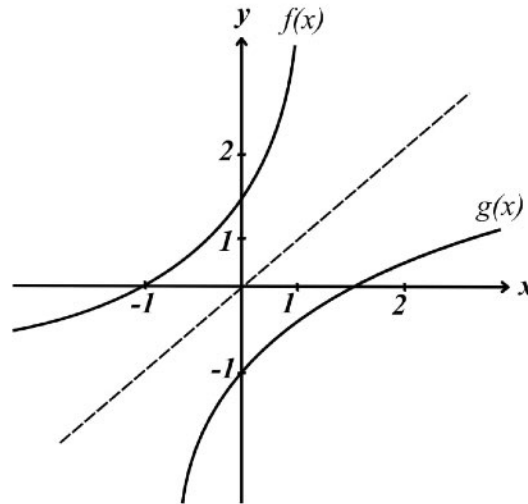
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- 10 Rajah 10 menunjukkan dua graf dengan keadaan graf fungsi g dipantulkan kepada graf fungsi f pada garis $y = x$.

Diagram 10 shows two graph such that the graph of function g is reflected to the graph of function f on the line $y = x$.



Rajah 10 / Diagram 10

Diberi fungsi / Given the function

$$g(x) = \frac{2x-3}{x+3}, x \neq -3$$

- (a) tentukan fungsi f ,
determine the function of f ,

[2 markah / marks]

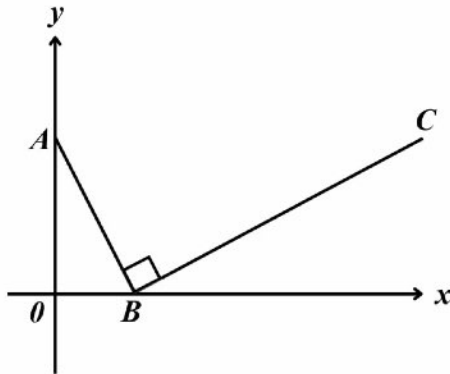
- (b) seterusnya, nyatakan nilai x supaya fungsi f adalah tidak tertakrif.
hence, state the value of x such that the function of f is undefined.

[1 markah / marks]

Jawapan / Answer :

- 11 Rajah 11 menunjukkan garis lurus AB berserenjang dengan garis lurus BC di titik B. Titik A dan titik B masing-masing terletak di paksi-y dan paksi-x.

Diagram 11 shows a straight line AB is perpendicular to the straight line BC on the point of B. Point A and point B are on y-axis and x-axis respectively.



Rajah 11 / Diagram 11

Diberi bahawa persamaan garis lurus AB ialah $\frac{x}{3} + \frac{y}{4} = 1$.

Given that the equation of straight line AB is $\frac{x}{3} + \frac{y}{4} = 1$.

- (a) Cari persamaan garis lurus BC.

Find the equation of straight line BC.

[3 markah / marks]

- (b) Garis lurus BC dipanjangkan dan menyilang paksi-y di titik D dengan kedaaan $2DB = BC$. Cari koordinat C.

Straight line BC is extended and crossed the y-axis at point D such that $2DB = BC$. Find the coordinate of C.

[3 markah / marks]

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Jawapan / *Answer* :

- 12 (a) Diberi $\sin \theta = \frac{2}{\sqrt{5}}$ dengan keadaan θ ialah sudut cakah. Cari $\tan 2\theta$.
Given $\sin \theta = \frac{2}{\sqrt{5}}$ where θ is an obtuse angle. Find $\tan 2\theta$.

[4 markah / marks]

- (b) Selesaikan persamaan $2 \cos x \sin x + \sqrt{3} \sin x = 0$ bagi
 $0^\circ < x < 360$.
Solve the equation $2 \cos x \sin x + \sqrt{3} \sin x = 0$ for $0^\circ < x < 360$.

[3 markah / marks]

Jawapan / Answer :

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Bahagian B / Section B

(16 markah / marks)

Jawab mana-mana **dua** soalan daripada bahagian ini.*Answer any **two** questions from this section.*

- 13** Diberi fungsi $f(x) = px^2 + 4x + q$ dengan keadaan p dan q ialah pemalar.
Given the function $f(x) = px^2 + 4x + q$, where p and q are constants.

- (a) Tunjukkan bahawa

Show that

$$f(x) = p\left(x + \frac{2}{p}\right)^2 + \frac{pq-4}{p}$$

[3 markah / marks]

- (b) Jika titik minimum bagi $f(x)$ ialah $(-4, 2)$, cari nilai p dan q .

If the minimum point of $f(x)$ is $(-4, 2)$, find the values of p and q .

[2 markah / marks]

- (c) Seterusnya, lakar graf $f(x)$ tersebut.

Hence, sketch the graph of $f(x)$.

[3 markah / marks]

Jawapan / Answer :

- 14 Diberi $y - 8 = 5x + x^2$, cari
Given that $y - 8 = 5x + x^2$, find

- (a) nilai bagi $\frac{dy}{dx}$ apabila $x = 4$.
the value of $\frac{dy}{dx}$ when $x = 4$.

[3 markah / marks]

- (b) perubahan kecil dalam y apabila x bertambah daripada 4 kepada 4.01.
the small corresponding change in y when x increase from 4 to 4.01.

[3 markah / marks]

- (c) kadar perubahan dalam y yang sepadan pada ketika $x = 4$, jika kadar perubahan dalam x ialah 0.4 unit per saat.
find the corresponding rate of change in y at $x = 4$, if the rate of change in x is 0.4 units per second.

. [2 markah / marks]

Jawapan / Answer :

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- 15 (a) Terbitkan rumus hasil tambah n sebutan pertama bagi jangjang geometri

$$S_n = \frac{a(1-r^n)}{1-r}.$$

Derive the formula the sum of the first n terms of geometric progression,

$$S_n = \frac{a(1-r^n)}{1-r}.$$

[4 markah / marks]

- (b) Diberi jangjang geometri 3, 18, 108, Cari bilangan sebutan bagi jangjang geometri ini supaya hasil tambahnya ialah 167, 961.

Given that the geometric progression 3, 18, 108, Find the number of terms if the sum of order is 167, 961.

[4 markah / marks]

Jawapan / Answer :

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

KEBARANGKALIAN Hujung Atas $Q(z)$ BAGI TABURAN NORMAL $N(0, 1)$
THE UPPER TAIL PROBABILITY $Q(z)$ FOR THE NORMAL DISTRIBUTION $N(0, 1)$

z	0	1	2	3	4	5	6	7	8	9	Minus / Tolak								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

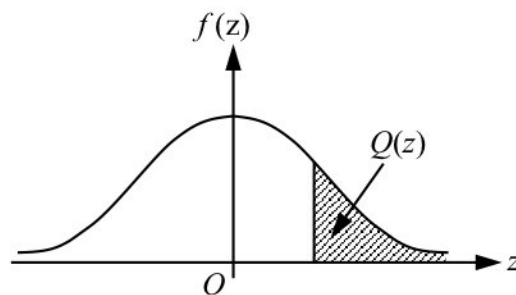
Bagi z negatif guna hubungan :

For negative z use relation :

$$Q(z) = 1 - Q(-z) = P(-z)$$

$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

$$Q(z) = \int_z^{\infty} f(z) dz$$



Contoh / Example :

Jika $X \sim N(0, 1)$, maka

If $X \sim N(0, 1)$, then

$$P(X > k) = Q(k)$$

$$P(X > 2.1) = Q(2.1) = 0.0179$$

[Lihat halaman sebelah

**MAKLUMAT UNTUK CALON
INFORMATION FOR CANDIDATES**

1. Kertas soalan ini mengandungi **15** soalan
This question paper consists of 15 questions.
2. Jawab **semua** soalan dalam Bahagian A dan **dua** soalan dalam Bahagian B.
*Answer **all** questions in Section A and **two** questions in Section B.*
3. Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan
Write your answers in the space provided in the question paper.
4. Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah
Show your working. It may help you to get marks.
5. Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu
If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
The diagrams in the questions provided are not drawn to scale unless stated.
7. Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.
The marks allocated for each question are shown in brackets.
8. Satu senarai rumus disediakan di halaman **2** dan **3**.
A list of formulae is provided on page 2 and 3.
9. Jadual Kebarangkalian Hujung Atas $Q(z)$ bagi Taburan Normal $N(0, 1)$ disediakan di halaman **25**.
The Upper Tail Probability $Q(z)$ For The Normal Distribution $N(0, 1)$ Table is provided on page 25.
10. Anda dibenarkan menggunakan kalkulator saintifik
You may use a scientific calculator.
11. Serahkan kertas soalan ini kepada pengawas peperiksaan di akhir peperiksaan.
Hand in this question paper to the invigilator at the end of the examination.