The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.
Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

SENARAI RUMUS

1 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2 $\log_a b = \dfrac{\log_c b}{\log_c a}$

3 $T_n = a + (n-1)d$

4 $T_n = ar^{n-1}$

5 $S_n = \dfrac{n}{2}\left[2a + (n-1)d\right]$

6 $S_n = \dfrac{a(r^n - 1)}{r-1} = \dfrac{a(1-r^n)}{1-r}$, $r \neq 1$

7 $Z = \dfrac{X - \mu}{\sigma}$

8 $P(X = r) = {}^nC_r\, p^r q^{n-r}$, $p + q = 1$

9 ${}^nP_r = \dfrac{n!}{(n-r)!}$

10 ${}^nC_r = \dfrac{n!}{(n-r)!r!}$

11 $I = \dfrac{Q_1}{Q_0} \times 100$

12 $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

13 $\sin^2 A + \cos^2 A = 1$
$\sin^2 A + \text{kos}^2 A = 1$

14 $\sec^2 A = 1 + \tan^2 A$
$\text{sek}^2 A = 1 + \tan^2 A$

15 $\text{cosec}^2 A = 1 + \cot^2 A$
$\text{kosek}^2 A = 1 + \text{kot}^2 A$

16 $\sin(A \pm B) = \sin A \cos B \mp \cos A \sin B$
$\sin(A \pm B) = \sin A \,\text{kos}\, B \pm \text{kos}\, A \sin B$

17 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
$\text{kos}(A \pm B) = \text{kos}\, A \,\text{kos}\, B \mp \sin A \sin B$

18 $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

19 $\sin 2A = 2 \sin A \cos A$
$\sin 2A = 2 \sin A \,\text{kos} A$

20 $\cos 2A = \cos^2 A - \sin^2 A$
$= 2\cos^2 A - 1$
$= 1 - 2\sin^2 A$
$\text{kos}\, 2A = \text{kos}^2 A - \sin^2 A$
$= 2\,\text{kos}^2 A - 1$
$= 1 - 2\sin^2 A$

21 $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

22 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

23 $a^2 = b^2 + c^2 - 2bc \cos A$
$a^2 = b^2 + c^2 - 2bc \,\text{kos}\, A$

24 **Area of triangle / *Luas segi tiga***

$= \dfrac{1}{2} ab \sin C$

[Lihat halaman sebelah

Bahagian A/*Section A*
(64 markah/*marks*).
Jawab **semua** soalan/ *Answer **all** questions*

1 Fungsi f, g dan h ditakrifkan oleh ;
The functions of f, g and h are defined by :

$$f(x) = x^2 + 1$$
$$g(x) = 2x - 5$$
$$h(x) = 2^x$$

(a) Selesaikan persamaan $fg(x) = g^{-1}(15)$
Solve the equation $fg(x) = g^{-1}(15)$

[3 markah / *marks*]

(b) Dengan menggunakan paksi yang sama, lakarkan graf $y = h(x)$ dan graf fungsi songsang $y = h^{-1}(x)$. Tunjukkan dengan jelas graf $h(x)$ dan $h^{-1}(x)$ nya.
By using the same axis, sketch the graph of $y = h(x)$ *and the graph of inverse function* $y = h^{-1}(x)$. *Show the graphs of* $h(x)$ *and* $h^{-1}(x)$ *clearly.*

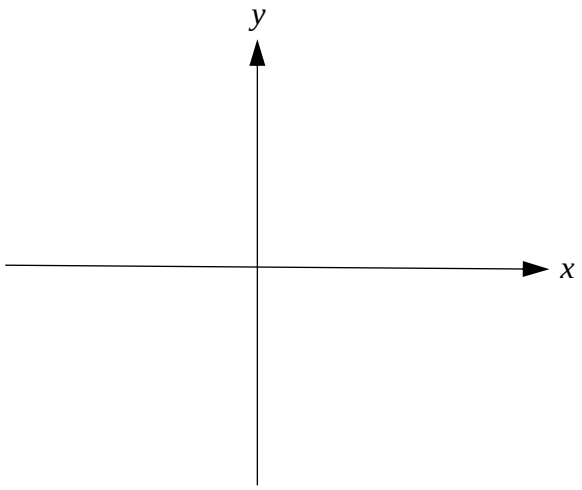
[2 markah / *marks*]

Jawapan/ *Answer* :

(a)

[Lihat halaman sebelah

(b)



1

5

---

2 Selesaikan sistem persamaan linear yang berikut dengan menggunakan kaedah penghapusan ;

Solve the following system of linear equations using the elimination method:

$$2x + 3y - z = 20$$

$$3x + 2y + z = 20$$

$$x + 4y + 2z = 15$$

[5 markah / *marks*]

Jawapan/ *Answer* :

2

5

3 (a) Sesaran, S_m, bagi komuter yang bergerak di atas landasan selepas $t\ saat$ diberi oleh $s(t) = t^2 + 2t$, dengan keadaan $t \geq 0$. Dengan menggunakan prinsip pertama, cari halaju komuter itu apabila $t = 7$.

The displacement, S_m, for a commuter which moves on the rail after $t\ seconds$ is given as $s(t) = t^2 + 2t$, where $t \geq 0$. By using the first derivative, find the velocity of the commuter when $t = 7$.

[4 markah / *marks*]

(b) Diberi $f(x) = \frac{(x^2-1)^3}{x^2+1}$, cari $f'(x)$.

Given $f(x) = \frac{(x^2-1)^3}{x^2+1}$, *find* $f'(x)$.

[3 markah / *marks*]

Jawapan/ *Answer*:

(*a*)

(*b*)

3

7

4

Rajah 4 / *Diagram 4*

Diberi sebuah silinder dengan lilitan bulatan $\frac{2\pi}{\sqrt{2}-1}$ cm dan tinggi $(\sqrt{2}+1)$ cm diisi dengan air minuman. Tunjukkan bahawa isipadu air minuman didalam silinder itu ialah $\left(7+5\sqrt{2}\right)\pi\ cm^3$.

Given a cylinder with a circumference of a circle $\frac{2\pi}{\sqrt{2}-1}$ cm *and the height* $(\sqrt{2}+1)$ cm *, is filled with drinking water. Show that the volume of the drinking water in the cylinder is* $\left(7+5\sqrt{2}\right)\pi\ cm^3$.

[4 markah / *marks*]

Jawapan/ *Answer*:

4

4

5 (a) Suatu nombor empat digit dibentuk daripada digit 3, 4, 6, 7 dan 9 tanpa ulangan. Berapakah bilangan nombor genap yang kurang daripada 6000 yang dapat dibentuk?.

A four-digit number is formed using the digit 3, 4, 6, 7 and 9 without repetition. How many even numbers that is less than 6000 can be formed?

[3 markah / *marks*]

(b) Sekumpulan 5 orang murid akan dipilih daripada 4 orang murid lelaki dan 4 orang perempuan untuk menyertai suatu persembahan. Cari bilangan cara berlainan murid tersebut boleh dipilih jika sekurang-kurangnya 3 orang murid lelaki mesti dipilih.

A group of 5 students is to be chosen from 4 boys and 4 girls to participate in a performance. Find the number of different ways the students can be selected if at least 3 boys must be selected.

[3 markah / *marks*]

Jawapan/ *Answer*:

(*a*)

(*b*)

5

6

6 (a) Jika α dan β adalah punca-punca bagi persamaan kuadratik $x^2 + (c+7)x + 5c = -10$, bentukkan persamaan kuadratik dengan punca-punca 2α dan 2β.

If α and β are the roots of the quadratic equations $x^2 + (c+7)x + 5c = -10$ .find the quadratic equation whose roots are 2α and 2β

[4 markah / *marks*]

(b) Cari julat nilai c jika persamaan kuadratik $x^2 + (c+7)x + 5c = -10$ mempunyai dua punca nyata yang berbeza

Find the range of values of c if the quadratic equation $x^2 + (c+7)x + 5c = -10$ has two real and different roots.

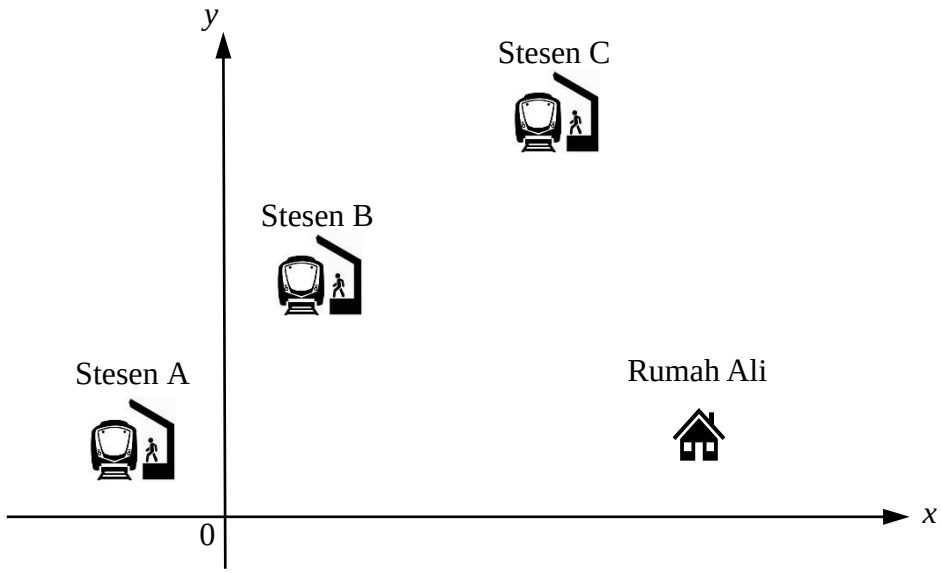
[2 markah / *marks*]

Jawapan/ *Answer*:

(*a*)

(*b*)

7



Rajah 7/ *Diagram 7*

Diberi stesen A, stesen B dan stesen C terletak pada garis lurus yang mempunyai persamaan $2x - y + 3 = 0$, manakala rumah Ali terletak pada titik koordinat $(9,1)$. Diberi jarak terdekat dari rumah Ali ke garis lurus tersebut adalah stesen B.

Given station A, station B and station C lie on a straight line which has an equation of $2x - y + 3 = 0$*, whereas Ali's house lies on the coordinate point* $(9,1)$*. Given the closest distance from Ali's house to the straight line is station B.*

Cari,

Find ,

(a) Persamaan garis lurus dari rumah Ali ke stesen B.

the straight line equation from Ali's house to station B.

[4 markah / *marks*]

(b) Koordinat titik B

The coordinate of point B

[2 markah / *marks*]

Jawapan/ *Answer*:

(*a*)

(*b*)

7

6

---

8 Diberi $5p - 2q$, $3p$ dan $2p + q$, dengan keadaan $p \neq q$ adalah tiga sebutan pertama bagi satu janjang geometri.

Given $5p - 2q$, $3p$ and $2p + q$, where $p \neq q$ are the first three terms of a geometric progression. .

a) Ungkapkan q dalam sebutan p,

Express q in terms of p

[3 markah / *marks*]

b) Seterusnya, cari nisbah sepunya janjang itu.

Hence, find the common ratio of the progression.

[3 markah / *marks*]

Jawapan/ *Answer*:

(*a*)

(*b*)

8

6

9 a) Diberi $\int_5^k (y-5)dy = 8$, cari nilai-nilai bagi k.

Given $\int_5^k (y-5)dy = 8$, *find the values of k.*

[3 markah/*marks*]

b) Diberi $\int_{-1}^{4} g(x)\,dx = 20$, cari $\int_{-1}^{2} 3g(x)\,dx + \int_{2}^{4} 3g(x)\,dx$.

Given $\int_{-1}^{4} g(x)\,dx = 20$, *find* $\int_{-1}^{2} 3g(x)\,dx + \int_{2}^{4} 3g(x)\,dx$

[2 markah/*marks*]

Jawapan/ *Answer*:

(a)

(b)

9

5

10 Diberi bahawa $kos\ \theta = t$, dimana θ adalah sudut tirus. Ungkapkan dalam sebutan t bagi,

Given that $cos\ \theta = t$, *where* θ *is an acute angle. Express the followings in term of* t

a) $tan\,\theta$

b) $sin\,(-\theta)$

c) $kos\ 2\theta$

[5 markah/*marks*]

Jawapan/ *Answer*:

(*a*)

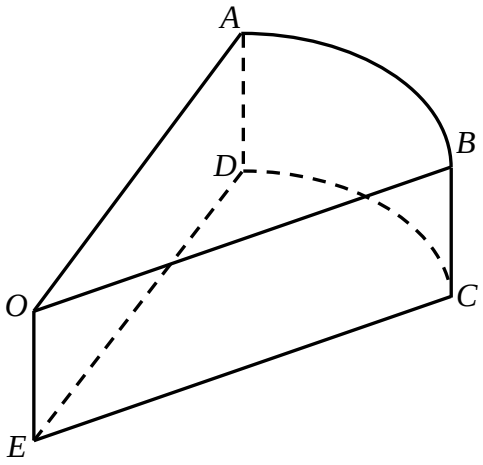
(*b*)

(c)

10

5

11



Rajah 11 / *Diagram* 11

Rajah 11 menunjukkan keratan rentas sepotong kek yang dipotong daripada kek bulat yang berdiameter 30 cm untuk membentuk suatu sektor *ABCD*. Diberi jumlah luas permukaan potongan kek itu ialah 509.8 cm^2 dan ketebalan kek itu ialah 6 cm.

Diagram 11 shows a cross section of a slice of a cake which is cut from a circular cake that has a diameter of 30 cm to form a sector ABCD. Given the total surface area of the slice of the cake is 509.8 cm^2 and its thickness is 6 cm.

Cari / *Find*

(a) sudut sektor itu dalam radian
the angle of the sector in radian.

[3 markah /*marks*]

(b) isipadu potongan kek itu dalam cm^3
the volume of the piece of cake that has been cut out, in cm^3

[2 markah /*marks*]

Jawapan/ *Answer*:

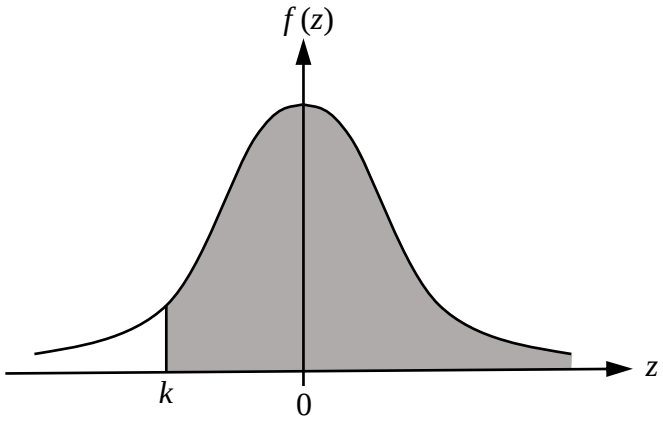
(*a*)

(*b*)

11

6

12 Rajah 12 menunjukkan graf bagi taburan normal piawai
Diagram 12 shows a standard normal distribution graph..



Rajah 12/ *Diagram 12*

Diberi bahawa $P(k < z < 0) = 0.3315$.

It is given that $P(k < z < 0) = 0.3315$.

(a) Cari nilai *k*
Find the value of k

(b) Pemboleh ubah rawak selanjar *X* bertabur secara normal dengan min μ dan sisihan piawai *3.5*. Cari nilai μ jika skor-*z* bagi *X = 57.64* ialah *k*
The continuous random variable X is normally distributed with a mean of μ *and a standard deviation 3.5. Find the value of* μ *if the z-score of X = 57.64 is k.*

[4 markah */marks*]

[Lihat halaman sebelah

Jawapan/ *Answer*:

(*a*)

(*b*)

12

4

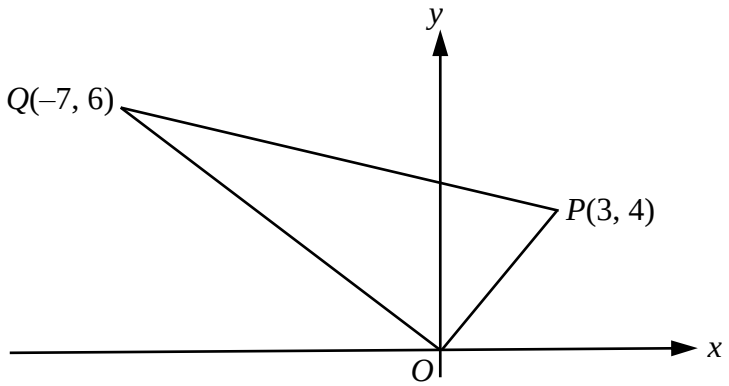
Bahagian B/*Section B*
(16 markah/*marks*)
Jawab **dua** soalan/ *Answer **two** questions*

13 (a) Diberi titik-titik $O(0,0), A(3,-1), B(-2,p)$ dan $C(5,3)$. Cari nilai p jika $\overrightarrow{OA}$ adalah selari dengan $\overrightarrow{AB}$.

Given points $O(0,0), A(3,-1), B(-2,p)$ and $C(5,3)$. Find the value of p if $\overrightarrow{OA}$ is parallel to $\overrightarrow{AB}$.

(b) Rajah menunjukkan dua vektor $\overrightarrow{OP}$ dan $\overrightarrow{OQ}$ pada satu satah Cartes.

Diagram shows two vectors $\overrightarrow{OP}$ dan $\overrightarrow{OQ}$ at the Cartesan plane.



Rajah 13/ *Diagram 13*

(i) Nyatakan $\overrightarrow{OP}$ dalam bentuk $x\,i + yj$

State $\overrightarrow{OP}$ in the form of $x\,i + yj$

(ii) Ungkapkan $\overrightarrow{PQ}$ dalam bentuk $\begin{pmatrix} x \\ y \end{pmatrix}$

Express $\overrightarrow{PQ}$ in the form of $\begin{pmatrix} x \\ y \end{pmatrix}$

(iii) Seterusnya cari vektor unit $\overrightarrow{PQ}$

Hence, find the unit vector of $\overrightarrow{PQ}$

[8 markah /*marks*]

Jawapan/ *Answer*:

(a)

[Lihat halaman sebelah

(b) (i)

(ii)

(iii)

13

8

14 Diberi lengkung $y = x^3 - 3x^2 - 9x + 15$. Cari,

Given a curve $y = x^3 - 3x^2 - 9x + 15$. *Find,*

a) koordinat titik pusingan bagi lengkung itu. Seterusnya, tentukan sama ada setiap titik pusingan itu ialah titik maksimum atau minimum.

the turning point of the curve. Hence, state whether each turning point is a maximum or minimum point.

[6 markah/*marks*]

b) koordinat titik lengkuk balas bagi lengkung itu.

the inflection point of the curve.

[2 markah/*marks*]

Jawapan/ *Answer*:

(a)

(b)

14

8

15 Dua pemboleh ubah , x dan y , dihubungkan dengan persamaan $y = \frac{hx}{kx+2}$ dengan h dan k adalah pemalar. Diberi apabila graf y melawan x dilukis , satu lengkung melalui titik (1,8) diperolehi. Apabila graf $\frac{1}{y}$ melawan $\frac{1}{x}$ dilukis, satu garis lurus penyuaian terbaik dengan pintasan -y, iaitu $\frac{1}{6}$ diperolehi.

The variables x and y are related by the equation $y = \frac{hx}{kx+2}$ *where h and k are constant. Given when graph y against x is drawn, one curve through the point (1,8) is obtained. When graph* $\frac{1}{y}$ *against* $\frac{1}{x}$ *is drawn, the line with best fit obtained passes through y-axes at* $\frac{1}{6}$.

(a) Tukar persamaan tak linear tersebut kepada persamaan linear, *Y=mX+c.* . Seterusnya, nyatakan nilai m dan c.
Convert the non-linear equation to the linear form, Y=mX+c. Hence , state the values of m and c.

[3 markah /*marks*]

(b) Cari nilai h dan k.
Find the values of h and k

[5 markah /*marks*]

Jawapan/ *Answer*:

(*a*)

(b)

15

8

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

[Lihat halaman sebelah

THE UPPER TAIL PROBABILITY $Q(z)$ FOR THE NORMAL DISTRIBUTION N(0, 1)
KEBARANGKALIAN HUJUNG ATAS $Q(z)$ *BAGI TABURAN NORMAL* N(0, 1)

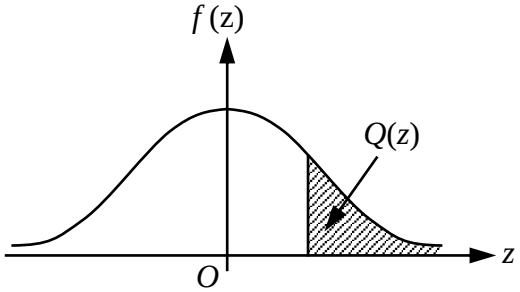
z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	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

For negative z use relation:
Bagi z negatif guna hubungan:

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

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

$$Q(z) = \int_k^{\infty} f(z)\mathrm{d}z$$



Example / *Contoh*:
If $X \sim N(0, 1)$, then
Jika $X \sim N(0, 1)$, *maka*
$P(X > k) = Q(k)$
$P(X > 2.1) = Q(2.1) = 0.0179$

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 sections 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**

   *A list of formulae is provided on page **2** .*

9. Jadual Kebarangkalian Hujung Atas Q(z) bagi Taburan Normal N(0, 1) disediakan di halaman **20**

   *The Upper Tail Probability Q(z) For The Normal Distribution N(0, 1) Table is provided on page **20.***

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.

[Lihat halaman sebelah