BAHAN KECEMERLANGAN

SPM

# BK 9

# MATEMATIK TAMBAHAN

Kertas 1

Nama: .....

Tingkatan: .....

# BAHAN KECEMERLANGAN (BK 9) 2014
# TINGKATAN 5

NAMA : .....

TINGKATAN : .....

## ADDITIONAL MATHEMATICS

**Kertas 1**

Dua jam

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tulis nombor kad pengenalan dan angka giliran anda pada petak yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Pelajar dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

| *Untuk Kegunaan Pemeriksa* | | |
|---|---|---|
| Soalan | Markah Penuh | Markah Diperoleh |
| 1 | 2 | |
| 2 | 2 | |
| 3 | 3 | |
| 4 | 3 | |
| 5 | 3 | |
| 6 | 3 | |
| 7 | 3 | |
| 8 | 3 | |
| 9 | 4 | |
| 10 | 3 | |
| 11 | 3 | |
| 12 | 3 | |
| 13 | 3 | |
| 14 | 4 | |
| 15 | 4 | |
| 16 | 3 | |
| 17 | 3 | |
| 18 | 4 | |
| 19 | 3 | |
| 20 | 3 | |
| 21 | 3 | |
| 22 | 4 | |
| 23 | 3 | |
| 24 | 4 | |
| 25 | 4 | |
| Jumlah | 80 | |

Kertas soalan ini mengandungi 21 halaman bercetak.

**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.***

## ALGEBRA

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

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. $\log_a mn = \log_a m + \log_a n$

6. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

7. $\log_a m^n = n \log_a m$

8. $\log_a b = \dfrac{\log_c b}{\log_c a}$

9. $T_n = a + (n-1)d$

10. $S_n = \dfrac{n}{2}\{2a + (n-1)d\}$

11. $T_n = ar^{n-1}$

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

13. $S_\infty = \dfrac{a}{1-r}, \quad |r| < 1$

---

## CALCULUS / KALKULUS

1. $y = uv$

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

2. $y = \dfrac{u}{v}, \quad \dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$

3. $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4. Area under a curve
*Luas di bawah lengkung*

$= \int_a^b y \, dx$ or / *atau*

$= \int_a^b x \, dy$

5. Volume generated
*Isipadu janaan*

$= \int_a^b \pi y^2 \, dx$ or / *atau*

$= \int_a^b \pi x^2 \, dy$

## STATISTICS / STATISTIK

1. $\bar{x} = \frac{\Sigma x}{N}$

2. $\bar{x} = \frac{\Sigma fx}{\Sigma f}$

3. $\sigma = \sqrt{\frac{\Sigma (x-\bar{x})^2}{N}} = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$

4. $\sigma = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{\Sigma f}} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$

5. $m = L + \left(\frac{\frac{1}{2}N - F}{f_m}\right)C$

6. $I = \frac{Q_1}{Q_0} \times 100$

7. $\bar{I} = \frac{\Sigma W_i I_i}{\Sigma W_i}$

8. ${}^nP_r = \frac{n!}{(n-r)!}$

9. ${}^nC_r = \frac{n!}{(n-r)!\,r!}$

10. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

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

12. Mean / *Min* $= np$

13. $\sigma = \sqrt{npq}$

14. $Z = \frac{X - \mu}{\sigma}$

---

## GEOMETRI (GEOMETRY)

1. Distance / *Jarak*

   $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

2. Midpoint / *Titik tengah*

   $(x, y) = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2}\right)$

3. A point dividing a segment of a line
   *Titik yang membahagi suatu tembereng garis*

   $(x, y) = \left(\frac{nx_1 + mx_2}{m+n} , \frac{ny_1 + my_2}{m+n}\right)$

4. Area of triangle / *Luas segi tiga*

   $\frac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

5. $|\mathbf{r}| = \sqrt{x^2 + y^2}$

6. $\hat{r} = \frac{x\mathbf{i} + y\mathbf{j}}{\sqrt{x^2 + y^2}}$

## TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$

   *Panjang lengkok*, $s = j\theta$

2. Area of sector $= \frac{1}{2} r^2\theta$

   *Luas sektor*, $L = \frac{1}{2} j^2\theta$

3. $\sin^2 A + \cos^2 A = 1$

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

4. $\sec^2 A = 1 + \tan^2 A$

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

5. $\text{cosec}^2 A = 1 + \cot^2 A$

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

6. $\sin 2A = 2 \sin A \cos A$

   $\sin 2A = 2 \sin A \text{ kos} A$

7. $\cos 2A = \cos^2 A - \sin^2 A$
   $= 2\cos^2 A - 1$
   $= 1 - 2\sin^2 A$

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

8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$

   $\sin(A \pm B) = \sin A \text{ kos} B \pm \text{kos} A \sin B$

9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

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

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

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

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

13. $a^2 = b^2 + c^2 - 2bc \cos A$

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

14. Area of triangle / *Luas segi tiga*

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

*For examiner's use only*

Answer **all** questions.

*Jawab semua soalan.*

**1**

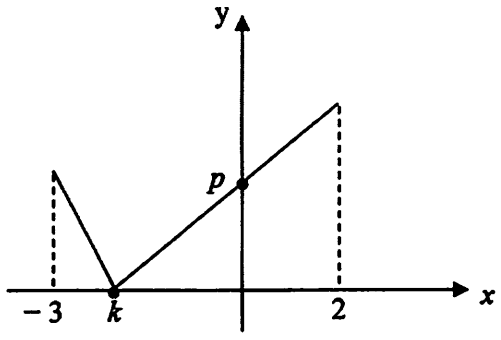



Diagram 1 / *Rajah 1*

Diagram 1 shows the graph of the function $g(x) = |2x + 3|$, for the domain $-3 \le x \le 2$.

*Rajah* 1 *menunjukkan graf bagi fungsi* $g(x) = |2x + 3|$, *untuk domain* $-3 \le x \le 2$.

State

*Nyatakan*

(*a*) the value of *k*.
*nilai k*.

(*b*) the value of *p*.
*nilai p*.

[ 2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

(a)

(b)

1

2

*For examiner's use only*

2 Given the function $f^{-1}(x) = \frac{2-x}{3}$, find the value of $q$ if $f(1) = q$.

*Diberi fungsi* $f^{-1}(x) = \frac{2-x}{3}$, *cari nilai q jika* $f(1) = q$.

[2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

2
2

3 Given that $m$ and $n$ are the roots of the quadratic equation $x^2 + 2x - 15 = 0$, form the quadratic equation that has the roots $\frac{1}{m}$ and $\frac{1}{n}$ [3 *marks*]

*Diberi m dan n adalah punca-punca persamaan kuadratik* $x^2 + 2x - 15 = 0$, *bentukkan persamaan kuadratik yang mempunyai punca-punca* $\frac{1}{m}$ *dan* $\frac{1}{n}$. [3 *markah*]

Answer / *Jawapan* :

3
3

*For examiner's use only*

4 Find the range of values of $p$ if the curve $f(x) = p(x^2 + 1) - 6x$ intersects the $x$-axis at two points. [3 *marks* ]

*Cari julat nilai p jika lengkung* $f(x) = p(x^2 + 1) - 6x$ *menyilang paksi-x pada dua titik.* [3 *markah*]

Answer / *Jawapan* :

4
3

5 Diagram 5 shows the graph of the function $y = (x - p)^2 - 3$, where p is a constant.

*Rajah 5 menunjukkan graf bagi fungsi* $y = (x - p)^2 - 3$, *dengan keadaan p adalah pemalar.*

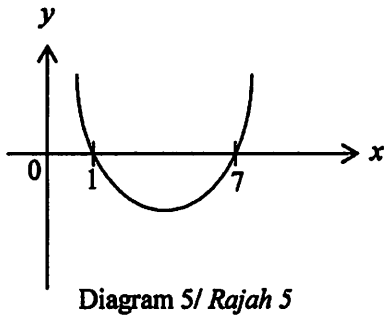



Diagram 5/ *Rajah 5*

Find/*Cari*

(a) the value of $p$,

*nilai p,*

(b) the equation of axis of symmetry,

*persamaan paksi simetri,*

(c) the coordinates of the minimum point . [3 *marks*]

*koordinat titik minimum.* [3 *markah*]

Answer / *Jawapan* :

(a)

(b)

(c)

5
3

*For examiner's use only*

6 Solve the equation : $\sqrt{27^{x+2}} = \frac{1}{9^{1-x}}$ [3 *marks*]

*Selesaikan persamaan* : $\sqrt{27^{x+2}} = \frac{1}{9^{1-x}}$ [3 *markah*]

Answer / *Jawapan*:

6

3

7 Solve the equation $\log_2 2p - \log_2(1-3p) = 1$. [3 *marks*]

*Selesaikan persamaan* $\log_2 2p - \log_2(1-3p) = 1$. [3 *markah*]

Answer / *Jawapan* :

7

3

*For examiner's use only*

8 The sum of the first $n$ terms of an arithmetic progression is given by $S_n = 3n + n^2$.
*Hasil tambah n sebutan pertama bagi suatu janjang aritmetik diberi oleh* $S_n = 3n + n^2$.
Find
*Cari*

(a) the first term,
*sebutan pertama,*

(b) common difference. [3 *marks*]
*beza sepunya.* [3 *markah*]

Answer / *Jawapan* :

(a)

(b)

8
3

9 The fourth term of a geometric progression is 8. The sum of the fourth term and the fifth term is 12.
Find
*Sebutan keempat suatu janjang geometri ialah* 8. *Hasil tambah sebutan keempat dan sebutan kelima ialah* 12. *Cari*

(a) the first term and the common ratio of the progression,
*sebutan pertama dan nisbah sepunya janjang itu,*

(b) the sum to infinity of the progression. [4 *marks*]
*hasil tambah hingga ketakterhinggan janjang itu.* [4 *markah*]

Answer / *Jawapan* :

9
4

*For examiner's use only*

**10** Diagram 10 shows parts of the graph of $\frac{1}{y}$ against $x$. The variables $x$ and $y$ are related by the equation $\frac{x}{y} = -px^2 + \frac{x}{q}$, where $p$ and $q$ are constant.

*Rajah* 10 *menunjukkan sebahagian graf* $\frac{1}{y}$ *melawan* $x$. *Pembolehubah* $x$ *dan* $y$ *dihubungkan oleh persamaan* $\frac{x}{y} = -px^2 + \frac{x}{q}$, *dengan keadaan* $p$ *dan* $q$ *adalah pemalar.*

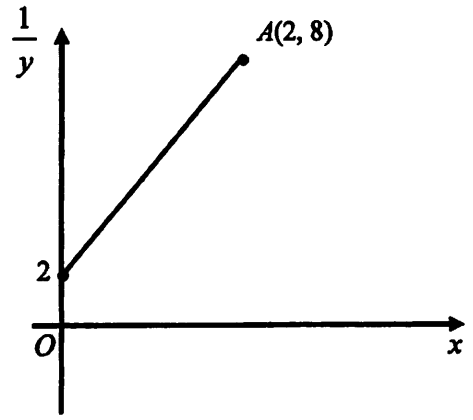



Diagram 10 / *Rajah* 10

Calculate the value of $p$ and of $q$.
*Hitung nilai* $p$ *dan nilai* $q$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

10

3

*For examiner's use only*

**11** Given that equation of a straight line $3y = (k-2)x + 5$ with gradient $-2$ and passes through point $(1, h)$. Find the value of $k$ and of $h$. [3 *marks*]

*Diberi suatu persamaan garis lurus* $3y = (k-2)x + 5$ *dengan kecerunan* $-2$ *dan melalui titik* $(1, h)$. *Cari nilai k dan nilai h.* [3 *markah*]

Answer / *Jawapan* :

11 | 3

**12** Table 12 shows the scores of a group of 40 students in a quiz competition.

*Jadual* 12 *menunjukkan skor sekumpulan* 40 *orang pelajar dalam suatu pertandingan kuiz.*

| Score *Skor* | 1 - 10 | 11 - 20 | 21 - 30 | 31 - 40 | 41 - 50 |
|---|---|---|---|---|---|
| Number of students *Bilangan pelajar* | 7 | 8 | 9 | 10 | 6 |

Table 12 / *Jadual* 12

Calculate the first quartile of the data. [3 *marks*]

*Hitung kuartil pertama bagi data itu.* [3 *markah*]

Answer / *Jawapan* :

12 | 3

*For examiner's use only*

13 The following information refers to the vectors $\underset{\sim}{u}$ and $\underset{\sim}{v}$.
*Maklumat berikut adalah berkaitan dengan vektor* $\underset{\sim}{u}$ dan $\underset{\sim}{v}$.

$$\underset{\sim}{u} = \begin{pmatrix} 12 \\ 6 \end{pmatrix}, \underset{\sim}{v} = \begin{pmatrix} m-2 \\ 2 \end{pmatrix},$$

It is given that $\underset{\sim}{u} = k\underset{\sim}{v}$, where $\underset{\sim}{u}$ is parallel to $\underset{\sim}{v}$ and $k$ is a constant

*Diberi bahawa* $\underset{\sim}{u} = k\underset{\sim}{v}$, *dengan keadaan* $\underset{\sim}{u}$ *selari dengan* $\underset{\sim}{v}$ *dan k ialah pemalar.*

Find the value of
*Cari nilai*

(a) $k$,

(b) $m$. [3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

13

3

*For examiner's use only*

**14** The following information refers to the vectors $\underset{\sim}{a}$ and $\underset{\sim}{b}$.

*Maklumat berikut adalah berkaitan dengan vektor* $\underset{\sim}{a}$ *dan vektor* $\underset{\sim}{b}$.

$$\underset{\sim}{a} = 2\underset{\sim}{i} + 5\underset{\sim}{j},\ \underset{\sim}{b} = -2\underset{\sim}{i} + 9\underset{\sim}{j}$$

Find
*Cari*

(a) the vector $3\underset{\sim}{a} - \underset{\sim}{b}$,
*vektor* $3\underset{\sim}{a} - \underset{\sim}{b}$,

(b) the unit vector in the direction of $3\underset{\sim}{a} - \underset{\sim}{b}$.
*vektor unit dalam arah* $3\underset{\sim}{a} - \underset{\sim}{b}$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:
(a)

(b)

14
4

---

**15** It is given that $\cos A = -\frac{12}{13}$ and $\sin B = \frac{3}{5}$ where A is the reflect angle and B is an obtuse angle.

*Diberi kos* $A = -\frac{12}{13}$ *dan* $\sin B = \frac{3}{5}$ *dengan keadaan A ialah sudut refleks dan B ialah sudut cakah.*

Find
*Cari*

(a) $\sec A$,
*sek A,*

(b) $\tan(A+B)$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:
(a)

(b)

15
4

*For examiner's use only*

16 A four-digit codes is to be formed from the digits **5, 6, 7, 8, 9**.

*Suatu kod empat digit hendak dibentuk daripada digit-digit* **5, 6, 7, 8, 9.**

Find

*Cari*

(a) the number of different four-digit codes that can be formed.

*bilangan kod empat digit yang berlainan yang dapat dibentuk.*

(b) the number of four-digit codes which is an odd number that can be formed.

*bilangan kod empat digit bernombor ganjil yang dapat dibentuk.*

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

16 3

17 A table tennis team consists of 5 students which is to be chosen from 6 boys and 5 girls.

*Satu pasukan ping pong terdiri daripada* 5 *orang pelajar yang akan dipilih daripada* 6 *lelaki dan* 5 *perempuan.*

Find the number of different ways to form the team so that each team consists of

*Cari bilangan cara yang berlainan untuk membentuk pasukan supaya setiap pasukan terdiri daripada*

(a) 3 boys,

3 *lelaki,*

(b) not more than 2 girls. [3 marks]

*tidak lebih daripada 2 perempuan.* [3 *markah*]

Answer / *Jawapan*:

(a)

(b)

17 3

*For examiner's use only*

**18.**

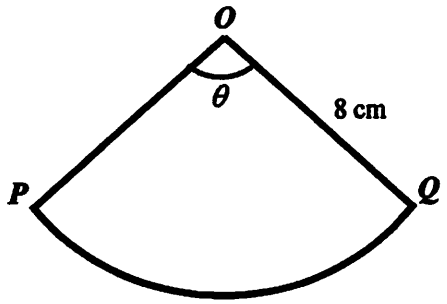



Diagram 18/ *Rajah* 18

Diagram 18 shows a sector *OPQ* with centre *O* and radius 8 cm. Given the area of the sector *OPQ* is 48 $cm^2$.

*Rajah* 18 *menunjukkan sebuah sektor OPQ berpusat O dan berjejari* 8 cm. *Diberi luas sektor OPQ ialah* 48 $cm^2$.

Find

*Cari*

(a) the value of $\theta$, in radian,

*nilai* $\theta$, *dalam radian,*

(b) the length of arc *PQ*.

*panjang lengkok PQ.*

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

18

4

*For examiner's use only*

**19** Given $y = 5x(3x+12)$, find

*Diberi* $y = 5x(3x+12)$, *cari*

(a) $\frac{dy}{dx}$,

(b) the minimum value of $y$.

*nilai minimum bagi* $y$.

[3 *marks*]

[3 *markah*]

Answer / *Jawapan* :

(a)

(b)

19

3

**20** Determine, in terms of $p$, the approximate change in the radius of the circle when the area of the circle increases from $784\pi$ to $(784 + p)\pi$, where $p$ is small.

*Tentukan, dalam sebutan p, anggaran perubahan dalam jejari bulatan apabila luas bulatan itu bertambah dari* $784\pi$ ke $(784 + p)\pi$, *dengan keadaan p adalah kecil.*

[3 *marks* ]

[3 *markah*]

Answer / *Jawapan* :

20

3

*For examiner's use only*

**21** Given $y = \frac{3}{(2x+1)^2}$ and $\frac{dy}{dx} = 3g(x)$, where $g(x)$ is a function in $x$.

Find the value of $\int_{-1}^{1} g(x)dx$.

*Diberi* $y = \frac{3}{(2x+1)^2}$ *dan* $\frac{dy}{dx} = 3g(x)$, *dengan keadaan* $g(x)$ *adalah fungsi dalam* $x$.

*Cari nilai bagi* $\int_{-1}^{1} g(x)dx$. [3 *marks*]

[3 *markah*]

Answer / *Jawapan*:

21

3

---

**22** Given the gradient function of a curve is $px - 3$, where $p$ is constant. The curve has a turning point at $(6, -1)$.

*Diberi fungsi kecerunan bagi suatu lengkung ialah* $px - 3$, *dengan keadaan* $p$ *adalah pemalar. Lengkung mempunyai titik pusingan pada* $(6, -1)$.

Find

*Cari*

(a) the value of $p$,
*nilai* $p$,

(b) the equation of curve.
*persamaan lengkung itu.* [4 *marks*]

[4 *markah*]

Answer/ *Jawapan :*

(a)

(b)

22

4

*For examiner's use only*

**23** Amy takes the driving test until she passes the test. Each time Amy takes the test, the probability that she passes is 0.7.

*Amy mengambil ujian memandu sehingga lulus ujian tersebut. Setiap kali Amy mengambil ujian, kebarangkalian dia lulus ialah* 0.7.
Find the probability if
*Cari kebarangkalian jika*

(a) Amy passes only at the third attempt,
*Amy lulus pada cubaan ketiga sahaja,*

(b) Amy passes in either the first or the second attempt.
*Amy lulus samada kali pertama atau kedua cubaan.*

[3 *marks*]
[3 *markah*]

Answer/*Jawapan* :

(a)

**23** 3

(b)

---

**24** A box contains 5 red cards and 3 green cards. A card is randomly picks from the box with replacement. If 8 trials done, find the probability that the cards drawn are
*Sebuah kotak mengandungi 5 keping kad merah dan 3 keping kad hijau. Sekeping kad dikeluarkan dengan pengembalian. Jika 8 percubaan dilakukan, cari kebarangkalian bahawa kad yang dikeluarkan itu*

(a) exactly 3 red cards,
*tepat 3 kad berwarna merah,*

(b) at least 2 green cards.
*sekurang-kurangnya 2 keping kad hijau.*

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

**24** 4

(a)

(b)

*For examiner's use only*

**25** A random variable $X$ has a normal distribution with a mean of $\mu$ and a standard deviation of 2.4.
*Pembolehubah rawak X mempunyai taburan normal dengan min $\mu$ dan sisihan piawai* 2.4.

Find,
*Cari,*

(a) the value of $\mu$ if the $z$ –score is 3.5 and $X = 15$,
*nilai $\mu$ jika skor-z nya ialah* 3.5 *dan* $X = 15$,

(b) $P(X \leq 7)$. [4 *marks*]
[4 *markah*]

Answer / *Jawapan* :

(a)

(b)

25

4

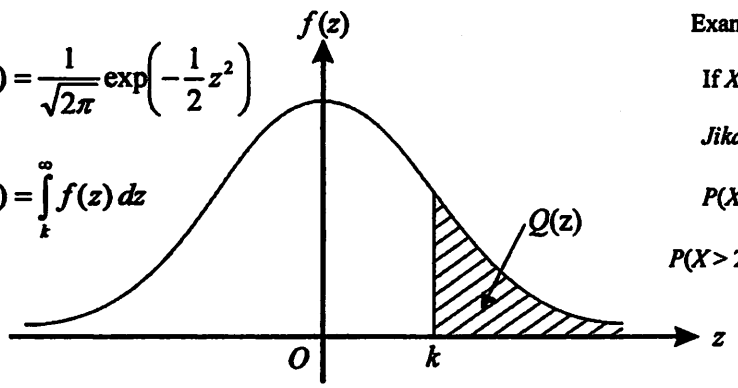
**END OF QUESTION PAPER**
***KERTAS SOALAN TAMAT***

**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 | 7 | 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 | 0.2548 | 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 | 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 | 0.0188 | 0.0183 | 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 | 0.0146 | 0.0143 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 2.3 | 0.0107 | 0.0104 | 0.0102 | | | | | | 0.0113 | 0.0110 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| | | | | 0.00990 | 0.00964 | 0.00939 | 0.00914 | 0.00889 | | | 3 | 5 | 8 | 10 | 13 | 15 | 18 | 20 | 23 |
| | | | | | | | | | 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 |

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

$$Q(z) = \int_k^\infty f(z)\, dz$$




Example / *Contoh*:

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

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

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

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

## INFORMATION FOR CANDIDATES
## *MAKLUMAT UNTUK CALON*

1. This question paper consists of **25** questions. Answer **all** questions.
   *Kertas soalan ini mengandungi* **25** *soalan. Jawab* **semua** *soalan.*

2. Write your answers in the spaces provided in this question paper.
   Tulis *Jawapan anda hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*

3. Show your working. It may help you to get marks.
   *Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.*

4. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
   *Jika anda hendak menukar jawapan, batalkan dengan kemas jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.*

5. The diagrams in the questions provided are not drawn to scale unless stated.
   *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*

6. The marks allocated for each question are shown in brackets.
   *Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.*

7. A list of formulae is provided on pages 2 to 4.
   *Satu senarai rumus disediakan di halaman* **2** *hingga* **4.**

8. You may use a scientific calculator.
   *Anda dibenarkan menggunakan kalkulator saintifik.*