**MAJLIS PENGETUA SMKA**

**i-MODUL KECEMERLANGAN SPM SMKA DAN SABK 2022**

**PEPERIKSAAN PERCUBAAN**
# SIJIL PELAJARAN MALAYSIA 2022
**MATEMATIK TAMBAHAN**
**Kertas 1**
**Okt./Nov.**
**2 jam**

**3472/1**

**Dua jam**

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| **JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU** | **Untuk Kegunaan Pemeriksa** | | |
|---|---|---|---|

| **Soalan** | **Markah Penuh** | **Markah Diperoleh** |
|---|---|---|
| **Bahagian A** | | |
| **1** | 2 | |
| **2** | 4 | |
| **3** | 5 | |
| **4** | 4 | |
| **5** | 7 | |
| **6** | 7 | |
| **7** | 6 | |
| **8** | 6 | |
| **9** | 5 | |
| **10** | 8 | |
| **11** | 7 | |
| **12** | 4 | |
| **Bahagian B** | | |
| **13** | 8 | |
| **14** | 8 | |
| **15** | 8 | |
| **Jumlah** | 80 | |

**1** *Tulis nama dan kelas anda pada ruangan yang disediakan.*

**2** *Kertas soalan ini adalah dalam dwibahasa.*

**3** *Soalan dalam Bahasa Melayu mendahului soalan yang sepadan dalam Bahasa Inggeris.*

**4** *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.*

**5** *Calon dikehendaki membaca maklumat di halaman* **25**.

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Kertas soalan ini mengandungi **25** halaman bercetak.

[Lihat halaman sebelah

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**RUMUS**
*FORMULAE*

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

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

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

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

14 $y = uv$ , $\dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

15 $y = \dfrac{u}{v}$ , $\dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$

16 $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

17 Luas di bawah lengkung
*Area under a curve*

$= \displaystyle\int_a^b y\, dx$ atau *(or)*

$= \displaystyle\int_a^b x\, dy$

18 Isi padu kisaran
*Volume of revolution*

$= \displaystyle\int_a^b \pi y^2\, dx$ atau *(or)*

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

19 $I = \dfrac{Q_1}{Q_0} \times 100$

20 $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

21 $^nP_r = \dfrac{n!}{(n-r)!}$

22 $^nC_r = \dfrac{n!}{(n-r)!\, r!}$

23 $P(X = r) = {}^nC_r\, p^r q^{n-r}, p + q = 1$

24 Min / *Mean* , $\mu = np$

25 $\sigma = \sqrt{npq}$

26 $Z = \dfrac{X - \mu}{\sigma}$

27 Panjang lengkok, $s = j\theta$
*Arc length*, $s = r\theta$

28 Luas sektor, $L = \dfrac{1}{2}j^2\theta$

*Area of sector* , $A = \dfrac{1}{2}r^2\theta$

29 $\sin^2 A + \kos^2 A = 1$
$\sin^2 A + \cos^2 A = 1$

30 $\sek^2 A = 1 + \tan^2 A$
$\sec^2 A = 1 + \tan^2 A$

31 $\kosek^2 A = 1 + \kot^2 A$
$\csc^2 A = 1 + \cot^2 A$

32 $\sin 2A = 2 \sin A \text{ kos } A$
$\sin 2A = 2 \sin A \cos A$

33 $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$
$\quad\quad\quad = 2 \text{ kos}^2 A - 1$
$\quad\quad\quad = 1 - 2 \sin^2 A$

$\cos 2A = \cos^2 A - \sin^2 A$
$\quad\quad\quad = 2 \cos^2 A - 1$
$\quad\quad\quad = 1 - 2 \sin^2 A$

34 $\tan 2A = \dfrac{2 \tan A}{1 - \tan^2 A}$

35 $\sin (A \pm B) = \sin A \text{ kos } B \pm \text{ kos } A \sin B$
$\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$

36 $\text{kos } (A \pm B) = \text{kos } A \text{ kos } B \mp \sin A \sin B$
$\cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$

37 $\tan (A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

38 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

39 $a^2 = b^2 + c^2 - 2bc \text{ kos } A$
$a^2 = b^2 + c^2 - 2bc \cos A$

40 Luas segi tiga / *Area of triangle*
$= \dfrac{1}{2} ab \sin C$

41 Titik yang membahagi suatu tembereng garis
*A point dividing a segment of a line*
$(x, y) = \left( \dfrac{nx_1 + mx_2}{m + n}, \ \dfrac{ny_1 + my_2}{m + n} \right)$

42 Luas segi tiga / *Area of triangle*
$= \dfrac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) \right|$

43 $|\mathbf{r}| = \sqrt{x^2 + y^2}$

44 $\hat{\mathbf{r}} = \dfrac{x\mathbf{i} + y\mathbf{j}}{\sqrt{x^2 + y^2}}$

## Bahagian A
[64 *markah*]
*Jawab* **semua** *soalan*.

**1** Diberi bahawa $\tan A = k$ dengan keadaan $0° < A < \dfrac{\pi}{2}$ , ungkapkan $\tan\left(\dfrac{\pi}{2} - A\right)$ dalam

sebutan *k*.                                    [2 *markah*]

*Given that* $\tan A = k$ *for* $0° < A < \dfrac{\pi}{2}$ , *express* $\tan\left(\dfrac{\pi}{2} - A\right)$ *in terms of k.*     [2 *marks*]

Jawapan/ *Answer*:

2    Diberi $f(x) = 2x + 1$ dan $fg(x) = \dfrac{10 + x}{x}$ , $x \neq 0$. Cari nilai $g(5)$.          [4 *markah*]

   *Given $f(x) = 2x + 1$ and $fg(x) = \dfrac{10 + x}{x}$ , $x \neq 0$. Find the value of $g(5)$.*          [4 *marks*]

   Jawapan/ *Answer*:

**3**    Pemboleh ubah $x$ dan $y$ dihubungkan oleh persamaan $2y = p - 4(x+1)^2$ dengan keadaan $p$ ialah pemalar.

*Variables x and y are related by the equation $2y = p - 4(x+1)^2$ such that p is a constant.*

     (a)    Apabila diplotkan graf $y$ melawan $(x+1)^2$, suatu graf garis lurus yang memintas paksi-$y$ pada titik $(0, 3)$ diperoleh. Carikan nilai $p$.          [2 *markah*]

           *When graph y against $(x + 1)^2$ is plotted, a straight line graph that passes through the y-axis at the point $(0, 3)$ is obtained. Find the value of p.*          [2 *marks*]

     (b)    Seterusnya carikan kecerunan, $m$ dan pintasan-$y$, $c$ bagi garis lurus yang diperoleh dengan memplot graf $y + 4x$ melawan $x^2$.          [3 *markah*]

           *Hence, find the gradient, m and y-intercept, c of the straight line obtained by plotting the graph $y + 4x$ against $x^2$.*          [3 *markah*]

Jawapan/ *Answer*:

**4**     Rajah 1 menunjukkan garis lurus PQ dengan persamaan $3x + 5y = 1$. Titik Q terletak pada paksi-$x$ dan titik P pada paksi-$y$.

*Diagram* 1 *shows a straight line PQ with the equation* $3x + 5y = 1$. *The point Q lies on the x-axis and the point P lies on the y-axis.*
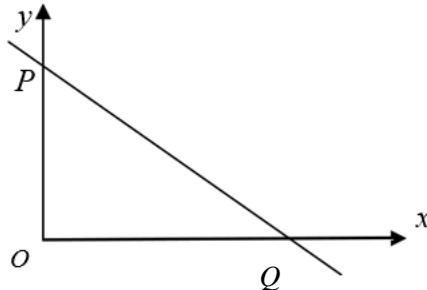


Rajah 1 / *Diagram* 1

Cari persamaan garis lurus yang berserenjang dengan PQ dan melalui titik Q.

*Find the equation of the straight line which is perpendicular to PQ and passes through the point Q.*

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

Jawapan/ *Answer*:

**5**   (a)  Selesaikan persamaan
        *Solve the equation*

$$2^x(8) = \left(\frac{1}{16}\right)^{2x+3}$$

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

  (b)  Tekanan udara, dalam mm Hg, bagi ketinggian 20 km di atas paras laut diberi oleh
$P = 759e^{-0.325h}$, dengan $h$ ialah ketinggian dalam km. Cari ketinggian di atas paras
laut jika tekanan pada ketinggian tersebut ialah 360 mm Hg.     [4 *markah*]

      *Air pressure, in* mm Hg, *for an altitude of* 20 km *above sea level is given by*
$P = 759e^{-0.325h}$, *with h is the height in* km. *Find the height above sea level if the
pressure at such an altitude is* 360 mm Hg.     [4 *marks*]

Jawapan/ *Answer*:

**6** (a) Cari nilai bagi [3 *markah*]
     *Find the value of* [3 *marks*]

$$\int_{-\frac{7}{2}}^{-3} (2p + 7)^3 \, dp$$

  (b) Diberi suatu lengkung $y = g(x)$. Persamaan tangen kepada lengkung itu ialah $y = 10$.
     Diberi $g'(x) = -x + 5$, cari persamaan lengkung itu. [4 *markah*]
     *Given a curve $y = g(x)$. The equation of the tangent to the curve is $y = 10$.*
     *Given that $g'(x) = -x + 5$, find the equation of the curve.* [4 *marks*]

Jawapan/ *Answer*:

**7** (a) Buktikan bahawa $\dfrac{1-\text{kos }2x}{1+\text{kos }2x} = \tan^2 x$. [3 *markah*]

*Prove that* $\dfrac{1-\cos 2x}{1+\cos 2x} = \tan^2 x$. [3 *marks*]

(b) Dengan menggunakan Rajah 2 , tunjukkan bahawa $sin^2\theta + kos^2\theta = 1$.
*By using Diagram* 2, *show that* $sin^2\theta + kos^2\theta = 1$.
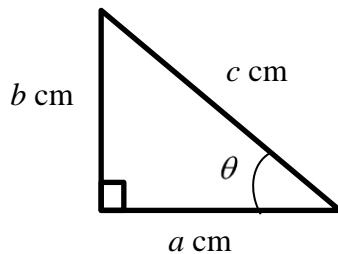


Rajah 2 / *Diagram* 2

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

Jawapan/ *Answer*:

**8**    Sebuah jam dinding akan berbunyi setiap jam dan sekarang menunjukkan pukul 12 tengah hari. Jam tersebut hampir kehabisan bateri, maka masa yang diambil untuk jarum jam bergerak ke pukul 1 dan seterusnya ialah 10% lebih lama daripada masa yang diambil sebelum itu.

*A wall clock gives hourly chime and currently shows* 12 pm. *The wall clock is almost out of battery, so the time taken for the clock hand to move to* 1 pm *and give out the next chime is* 10% *longer than the time taken previously.*

(a)   Jika jarum jam dinding bergerak dari pukul 4 ke pukul 5 petang, berapakah masa, dalam minit, yang diambil oleh jarum tersebut?            [3 *markah*]

*If the clock hand moves from* 4 pm *to* 5 pm, *how much time, in minutes, taken by the clock hands?*            [3 *marks*]

(b)   Jika bateri hanya bertahan selama 12 jam, berapa kalikah lagi jam akan berbunyi?

*If the battery will only last for exactly* 12 hours, *how many more times will the clock chime?*            [3 *markah*]

                                                             [3 *marks*]

Jawapan/ *Answer*:

**9** (a) Rajah 3 menunjukkan segi tiga *OAC*. Diberi bahawa $BC = \dfrac{2}{3}AB$, $\overrightarrow{BO} = \underset{\sim}{x}$ dan $\overrightarrow{AB} = \underset{\sim}{y}$.

*Diagram 3 shows a triangle OAC. Given that* $BC = \dfrac{2}{3}AB$, $\overrightarrow{BO} = \underset{\sim}{x}$ *and* $\overrightarrow{AB} = \underset{\sim}{y}$.
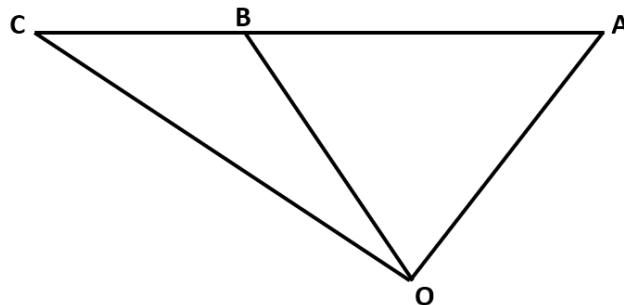


Rajah 3 / *Diagram* 3

Ungkapkan $\overrightarrow{CO}$ dalam sebutan $\underset{\sim}{x}$ dan/atau $\underset{\sim}{y}$. [2 *markah*]

*Express* $\overrightarrow{CO}$ *in terms of* $\underset{\sim}{x}$ *and/or* $\underset{\sim}{y}$. [2 *marks*]

(b) Seterusnya, cari vektor unit dalam arah $\overrightarrow{OC}$, jika $\underset{\sim}{x} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ dan $\underset{\sim}{y} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$. [3 *markah*]

*Hence, find the unit vector in the direction of* $\overrightarrow{OC}$ *if* $\underset{\sim}{x} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ *and* $\underset{\sim}{y} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$. [3 *marks*]

Jawapan/ *Answer*:

10  Diberi titik $P(1, 6)$ berada di atas suatu lengkung $f(x) = x^2 + 5x$. Cari

*Given that a point P(1, 6) lies on a curve $f(x) = x^2 + 5x$. Find*

(a) fungsi kecerunan lengkung itu dengan menggunakan prinsip pertama,

$$f'(x) = \underset{\delta x \to 0}{\text{had}} \frac{f(x + \delta x) - f(x)}{\delta x}$$  [3 *markah*]

*the gradient function of the curve by using first principles,*

$$f'(x) = \underset{\delta x \to 0}{\lim} \frac{f(x + \delta x) - f(x)}{\delta x}$$  [3 *marks*]

(b) persamaan tangen lengkung itu pada titik *P*.  [3 *markah*]
*the equation of the tangen to the curve at point P.*  [3 *marks*]

(c) persamaan normal pada titik *P*.  [2 *markah*]
*the equation of the normal to the curve at point P.*  [2 *marks*]

Jawapan/ *Answer*:

**11** (a)   Adelea ingin mendaftar perbankan internet beliau buat pertama kali. Untuk menetapkan kata laluan, beliau perlu menetapkan 5 aksara yang dipilih daripada 10 aksara dibawah.

*Adelea wants to register her internet banking for the first time. To set a password, she needs to set 5 character which is to be chosen from the following 10 characters.*

| Huruf<br>*Letters* | Nombor<br>*Numbers* | Simbol<br>*Symbols* |
|:---:|:---:|:---:|
| A | | |
| B | 2 | |
| M | 1 | #<br><br>& |
| N | 7 | |
| X | | |

Setiap aksara hanya boleh digunakan sekali sahaja untuk kata laluan tersebut. Cari bilangan cara 5 aksara kata laluan yang berlainan yang boleh disusun sekiranya

*Each character may be used only once in any password. Find the number of different 5 character passwords that may be chosen if*

(i)   kata laluan tersebut mesti mengandungi 2 huruf, 2 nombor dan 1 simbol dalam susunan tersebut.

*the password must consist of 2 letters, 2 numbers and 1 symbol respectively.*

[2 *markah*]

[2 *marks*]

(ii)   kata laluan tersebut tersebut mesti bermula dan berakhir dengan nombor ganjil.

*the password must start and finish with an odd number.*

[2 *markah*]

[2 *marks*]

(b)    Sebuah galeri seni ingin mengadakan suatu pameran seni. Terdapat 9 ruang untuk mempamerkan lukisan-lukisan tersebut. Dua orang pelukis tempatan dipilih untuk menyertai pameran tersebut. Pelukis A mempunyai 10 buah lukisan manakala pelukis B mempunyai 5 buah lukisan. Cari bilangan cara lukisan yang berlainan yang boleh dipilih sekiranya

*An art gallery wants to organize an art exhibition. There are 9 spaces to exhibit the paintings. 2 local painters are selected to join the exhibition. Artist A has 10 paintings while artist B has 5 paintings. Find the number of different paintings that can be chosen if*

(i)    tiada syarat-syarat dikenakan.                    [1 *markah*]
      *there are no restrictions.*                         [1 *marks*]

(ii)    galeri seni tersebut perlu memilih 6 buah lukisan daripada pelukis A dan 3 buah lukisan daripada pelukis B.           [2 *markah*]
      *the art gallery needs to choose 6 paintings from artist A and 3 paintings from artist B.*           [2 *marks*]

   Jawapan/ *Answer*:

**12** Rajah 4 menunjukkan sebuah bulatan berpusat O dan berjejari *r* cm. Diberi sudut *POR=θ* radian.

*Diagram 4 shows a circle, with centre O and radius r* cm. *Given the angle of POR=θ radians.*
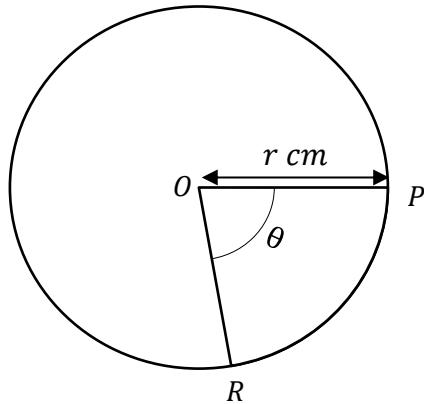


Rajah 4 / *Diagram 4*

(a) Diberi luas sektor major POR ialah 5 kali luas sektor minor POR, cari nilai $\theta$.

*Given the area of the major sector POR is 5 times the area of the minor sector POR, find the value of $\theta$.*

[2 *markah*]

[2 *marks*]

(b) Diberi perimeter sektor minor POR ialah 15 cm. Cari nilai *r*, betul kepada 3 tempat perpuluhan. [Gunakan $\pi = 3.142$]

*Given the perimeter of the minor sector POR is 15 cm. Find the value of r, correct to 3 decimal places.* [*Use* $\pi = 3.142$]

[2 markah]

[2 *marks*]

[Lihat halaman sebelah
**TERHAD**

Jawapan/ *Answer*:

## Bahagian B

[16 *markah*]

*Bahagian ini mengandungi* **tiga** *soalan. Jawab mana-mana* **dua** *soalan.*

**13** (a) Ungkapkan graf fungsi $f(x) = 2 + 4x - 3x^2$ sebagai $f(x) = a(x - b)^2 + c$ dengan keadaan $a$, $b$ dan $c$ ialah pemalar. Tentukan nilai maksimum atau minimum dan persamaan paksi simetri bagi graf fungsi tersebut.

*Express the graph of function $f(x) = 2 + 4x - 3x^2$ as $f(x) = a(x - b)^2 + c$ such that a, b and c are constant. Determine the value of maximum or minimum and find the equation of the axis of symmetry.*

[4 *markah*]

[4 *marks*]

(b) Seterusnya, buat generalisasi terhadap bentuk dan kedudukan graf apabila nilai-nilai berikut berubah.

*Hence, make generalisation on the shape and position of the graph when the following values change.*

(i) nilai $a$ berubah kepada -9.

*the value of a changes to -9.*

(ii) nilai $b$ berubah kepada $\frac{5}{3}$.

*the value of b changes to $\frac{5}{3}$.*

[4 *markah*]

[4 *marks*]

Jawapan/ *Answer*:

**14** (a) Nisbahkan penyebut dan permudahkan

*Rationalize and simplify*

$$\frac{7\sqrt{5}}{14-\sqrt{5}}$$

[3 *markah*]

[3 *marks*]

(b) Rajah 5 menunjukkan sebuah silinder dengan jejari $4\sqrt{3}$ cm dan tinggi $h$ cm. Jumlah luas permukaan silinder ialah $56\sqrt{6}\ \pi\ cm^2$.

*Diagram 5 shows a cylinder with radius $4\sqrt{3}$ cm and height h cm. The total surface area of the cylinder is $56\sqrt{6}\ \pi\ cm^2$.*
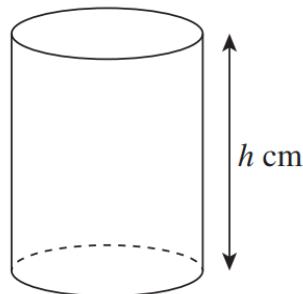


Rajah 5 / *Diagram* 5

Cari nilai $h$ dan beri jawapan dalam bentuk $a\sqrt{2}+b\sqrt{3}$, dengan keadaan $a$ dan $b$ adalah integer.

*Find the value of h and give your answer in the form $a\sqrt{2}+b\sqrt{3}$, where a and b are integers.*

[5 *markah*]

[5 *marks*]

Jawapan/ *Answer*:

15     Setiap bulan Puan Aini menerima RM 2 650 daripada penyewa untuk 3 buah rumahnya. Puan Aini mengupah Encik Azlan untuk menguruskan rumah-rumah tersebut. Puan Aini membayar kepada Encik Azlan seperti maklumat di dalam Jadual 1.

*Every month Puan Aini receives* RM 2 650 *from tenants for her* 3 *houses. Puan Aini hires Encik Azlan to manage the houses. Puan Aini paid to Encik Azlan as the information in Table* 1.

| Jenis Rumah / *Type of house* | Peratus upah Encik Azlan dari bayaran sewa rumah / *The percentage of Encik Azlan's wages from the house rent* |
|---|---|
| Rumah teres setingkat / *Single storey terrace house* | 10% |
| Rumah teres dua tingkat / *Double-storey terraced house* | 20% |
| Rumah semi-D / *Semi-D house* | 30% |

Jadual 1 / *Table* 1

Jika sewa rumah semi-D ialah dua kali sewa rumah teres setingkat dan jumlah upahnya ialah RM 595, maka berapakah bayaran sewa untuk setiap rumah?

*If the rent of a semi-D house is twice the rent of a high-rise house and the total wages is* RM 595, *then how much is the rent for each house?*

[8 *markah*]

[*8 marks*]

**KERTAS SOALAN TAMAT**

[Lihat halaman sebelah
**TERHAD**

Jawapan/ *Answer*:

## 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 | .5000 | .4960 | .4920 | .4880 | .4840 | .4801 | .4761 | .4721 | .4681 | .4641 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 0.1 | .4602 | .4562 | .4522 | .4483 | .4443 | .4404 | .4364 | .4325 | .4286 | .4247 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 0.2 | .4207 | .4168 | .4219 | .4090 | .4052 | .4013 | .3974 | .3936 | .3897 | .3859 | 4 | 8 | 12 | 15 | 19 | 23 | 27 | 31 | 35 |
| 0.3 | .3821 | .3783 | .3745 | .3707 | .3669 | .3632 | .3594 | .3557 | .3520 | .3483 | 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 34 |
| 0.4 | .3446 | .3409 | .3372 | .3336 | .3300 | .3264 | .3228 | .3192 | .3156 | .3121 | 4 | 7 | 11 | 15 | 18 | 22 | 25 | 29 | 32 |
| 0.5 | .3085 | .3050 | .3015 | .2981 | .2946 | .2912 | .2877 | .2843 | .2810 | .2776 | 3 | 7 | 10 | 14 | 17 | 20 | 24 | 27 | 31 |
| 0.6 | .2743 | .2709 | .2676 | .2643 | .2611 | .2578 | .2546 | .2514 | .2483 | .2451 | 3 | 7 | 10 | 13 | 16 | 19 | 23 | 26 | 29 |
| 0.7 | .2420 | .2389 | .2358 | .2327 | .2296 | .2266 | .2236 | .2206 | .2177 | .2148 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 0.8 | .2119 | .2090 | .2061 | .2033 | .2005 | .1977 | .1949 | .1922 | .1894 | .1867 | 3 | 5 | 8 | 11 | 14 | 16 | 19 | 22 | 25 |
| 0.9 | .1841 | .1814 | .1788 | .1762 | .1736 | .1711 | .1685 | .1660 | .1635 | .1611 | 3 | 5 | 8 | 10 | 13 | 15 | 18 | 20 | 23 |
| 1.0 | .1587 | .1562 | .1539 | .1515 | .1492 | .1469 | .1446 | .1423 | .1401 | .1379 | 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 |
| 1.1 | .1357 | .1335 | .1314 | .1292 | .1271 | .1251 | .1230 | .1210 | .1190 | .1170 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 1.2 | .1151 | .1131 | .1112 | .1093 | .1075 | .1056 | .1038 | .1020 | .1003 | .0985 | 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 |
| 1.3 | .0968 | .0951 | .0934 | .0918 | .0901 | .0885 | .0869 | .0853 | .0838 | .0823 | 2 | 3 | 5 | 6 | 8 | 10 | 11 | 13 | 14 |
| 1.4 | .0808 | .0793 | .0778 | .0764 | .0749 | .0735 | .0721 | .0708 | .0694 | .0681 | 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 13 |
| 1.5 | .0668 | .0655 | .0643 | .0630 | .0618 | .0606 | .0594 | .0582 | .0571 | .0559 | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 |
| 1.6 | .0548 | .0537 | .0526 | .0516 | .0505 | .0495 | .0485 | .0475 | .0465 | .0455 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1.7 | .0446 | .0436 | .0427 | .0418 | .0409 | .0401 | .0392 | .0384 | .0375 | .0367 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 |
| 1.8 | .0359 | .0351 | .0344 | .0336 | .0329 | .0322 | .0314 | .0307 | .0301 | .0294 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 6 |
| 1.9 | .0287 | .0281 | .0274 | .0268 | .0262 | .0256 | .0250 | .0244 | .0239 | .0233 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5 |
| 2.0 | .0228 | .0222 | .0217 | .0212 | .0207 | .0202 | .0197 | .0192 | .0188 | .0183 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| 2.1 | .0179 | .0174 | .0170 | .0166 | .0162 | .0158 | .0154 | .0150 | .0146 | .0143 | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 |
| 2.2 | .0139 | .0136 | .0132 | .0129 | .0125 | .0122 | .0119 | .0116 | .0113 | .0110 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 2.3 | .0107 | .0104 | .0102 | | | | | | | | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| | | | | $.0^2990$ | $.0^2964$ | $.0^2939$ | $.0^2914$ | | | | 3 | 5 | 8 | 10 | 13 | 15 | 18 | 20 | 23 |
| | | | | | | | | $.0^2889$ | $.0^2866$ | $.0^2842$ | 2 | 5 | 7 | 9 | 12 | 14 | 16 | 16 | 21 |
| 2.4 | $.0^2820$ | $.0^2798$ | $.0^2776$ | $.0^2755$ | $.0^2734$ | | | | | | 2 | 4 | 6 | 8 | 11 | 13 | 15 | 17 | 19 |
| | | | | | | $.0^2714$ | $.0^2695$ | $.0^2676$ | $.0^2657$ | $.0^2639$ | 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 |
| 2.5 | $.0^2621$ | $.0^2604$ | $.0^2587$ | $.0^2570$ | $.0^2554$ | $.0^2539$ | $.0^2523$ | $.0^2508$ | $.0^2494$ | $.0^2480$ | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 |
| 2.6 | $.0^2466$ | $.0^2453$ | $.0^2440$ | $.0^2427$ | $.0^2415$ | $.0^2402$ | $.0^2391$ | $.0^2379$ | $.0^2368$ | $.0^2357$ | 1 | 2 | 3 | 5 | 6 | 7 | 9 | 9 | 10 |
| 2.7 | $.0^2347$ | $.0^2336$ | $.0^2326$ | $.0^2317$ | $.0^2307$ | $.0^2298$ | $.0^2289$ | $.0^2280$ | $.0^2272$ | $.0^2264$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2.8 | $.0^2256$ | $.0^2248$ | $.0^2240$ | $.0^2233$ | $.0^2226$ | $.0^2219$ | $.0^2212$ | $.0^2205$ | $.0^2199$ | $.0^2193$ | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 6 |
| 2.9 | $.0^2187$ | $.0^2181$ | $.0^2175$ | $.0^2169$ | $.0^2164$ | $.0^2159$ | $.0^2154$ | $.0^2149$ | $.0^2144$ | $.0^2139$ | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| 3.0 | $.0^2135$ | $.0^2131$ | $.0^2126$ | $.0^2122$ | $.0^2118$ | $.0^2114$ | $.0^2111$ | $.0^2107$ | $.0^2104$ | $.0^2100$ | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 |

For negative $z$ use relation:
*Bagi $z$ negatif guna hubungan*:
$$Q(z) = 1 - Q(-z) = P(-z)$$
$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$
$$Q(z) = \int_{k}^{\infty} f(z)\, dz$$

$f(z)$

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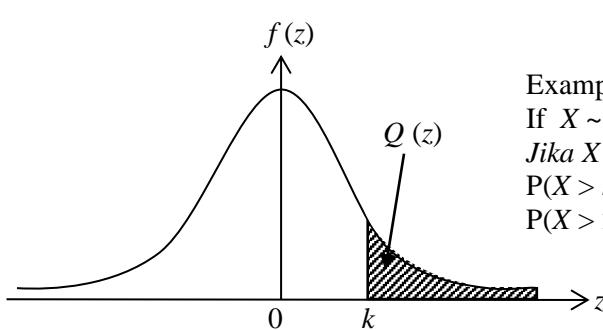
Example / *Contoh*:
If $X \sim$ N(0, 1), then
*Jika $X \sim$ N(0, 1), maka*
P($X > k$) = $Q(k)$
P($X > 2.1$) = $Q(2.1)$ = 0.0179

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

1. Kertas soalan ini mengandungi **dua** bahagian: **Bahagian A** dan **Bahagian B.**
   *This question paper consists of **two** sections: **Section A** and **Section B.***

2. Jawab **semua** soalan dalam **Bahagian A** dan mana-mana **dua** soalan daripada **Bahagian B.**
   *Answer **all** questions in **Section A** and any **two** questions from **Section B.***

3. Tulis jawapan anda pada ruang yang disediakan dalam kertas soalan.
   *Write your answers in the spaces provided in this 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 baru.
   *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 pages **2** and **3**.*

9. Jadual Kebarangkalian Hujung Atas Q(z) Bagi Taburan Normal N(0, 1) disediakan di halaman **24**.
   *The Upper Tail Probability Q(z) For the Normal Distribution N(0, 1) Table is provided on page **24.***

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

11. Serahkan kertas soalan ini kepada pengawas peperiksaan pada akhir peperiksaan.
    *Hand in this question paper to the invigilator at the end of the examination.*