

SENARAI RUMUS

1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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. $\log_a \frac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \frac{\log_c b}{\log_c a}$
9. $T_n = a + (n-1)d$
10. $S_n = \frac{n}{2}[2a + (n-1)d]$
11. $T_n = ar^{n-1}$
12. $S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$
13. $S_\infty = \frac{a}{1-r}, |r| < 1$
14. $y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$
15. $y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$
16. $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
17. Luas di bawah lengkung
Area under a curve
 $= \int_a^b y \, dx$ atau / or $= \int_a^b x \, dy$
18. Isipadu kisan / *Volume of revolution*
 $= \int_a^b \pi y^2 dx$ atau / or $= \int_a^b \pi x^2 dy$
19. $I = \frac{Q_1}{Q_0} \times 100$
20. $I = \frac{\sum W_i I_i}{\sum W_i}$
21. ${}^n P_r = \frac{n!}{(n-r)!}$
22. ${}^n C_r = \frac{n!}{(n-r)!r!}$
23. $P(X=r) = {}^n C_r p^r q^{n-r}, p+q=1$
24. Min / *mean*, $\mu = np$
25. $\sigma = \sqrt{npq}$
26. $z = \frac{X - \mu}{\sigma}$
27. Panjang lengkok, $s = j\theta$
Arc length, $s = r\theta$
28. Luas sektor, $L = \frac{1}{2} j^2 \theta$ / *Area of sector*, $L = \frac{1}{2} r^2 \theta$
29. $\sin^2 A + \cos^2 A = 1$
 $\sin^2 A + \cos^2 A = 1$
30. $\sec^2 A = 1 + \tan^2 A$
 $\sec^2 A = 1 + \tan^2 A$
31. $\operatorname{cosec}^2 A = 1 + \cot^2 A$
 $\operatorname{cosec}^2 A = 1 + \cot^2 A$
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 $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \pm \tan A \tan B}$
- 38 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- 39 $a^2 = b^2 + c^2 - 2 \cos A$
 $a^2 = b^2 + c^2 - 2 \cos A$
- 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 $|r| = \sqrt{x^2 + y^2}$
- 44 $\hat{r} = \frac{x\hat{i} + y\hat{j}}{\sqrt{x^2 + y^2}}$



Bahagian A

[64 markah]

Jawab semua soalan.

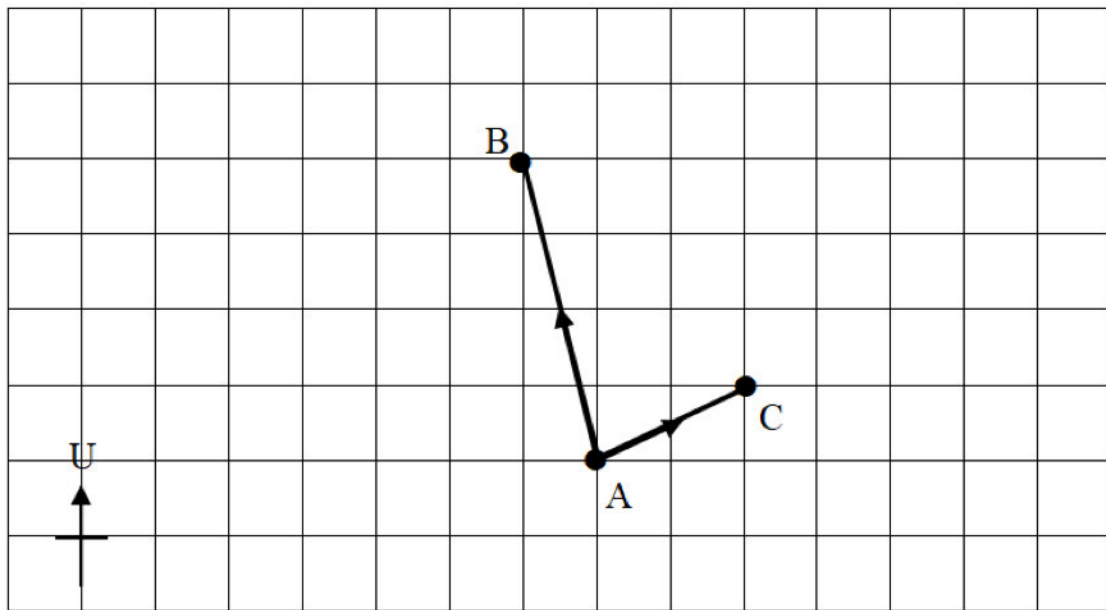
- 1 (a) Titik–titik $A(2,1)$, $B(m,n)$ dan $C(5,4)$ terletak pada suatu garis lurus. Titik B membahagikan garis lurus AC dengan nisbah 2: 3. Cari nilai m dan n .
Points $A(2,1)$, $B(m,n)$ and $C(5,4)$ are on a straight line. B divides the straight line AC in the ratio 2: 3. Find the values of m and n .
- [2 markah]
[2 marks]
- (b) Titik $P(x,y)$ bergerak dengan jaraknya dari titik $M(-1,4)$ dan $N(5,-2)$ dalam nisbah 1: 2 .
Cari persamaan lokus bagi titik bergerak P .
A point moves such that its distances from points $M(-1,4)$ and $N(5,-2)$ are in the ratio 1: 2. Find the equation of the locus of the moving point P .

[3 markah]

[3 marks]

Jawapan/ Answer:

- 2 Rajah 1 menunjukkan $\overrightarrow{AB}$ dan $\overrightarrow{AC}$ yang dilukis pada grid segi empat sama bersisi 1 unit.
Diagram 1 shows $\overrightarrow{AB}$ and $\overrightarrow{AC}$ which are drawn on a 1-unit sided square grid.



Rajah 1
Diagram 1

- (a) Suatu zarah mula bergerak dari titik A ke titik B seperti yang ditunjukkan dalam Rajah 1. Nyatakan sama ada pergerakan itu ialah kuantiti vektor atau kuantiti skalar. Berikan justifikasi anda.

A particle starts moving from point A to point B as shown in Diagram 1. State whether the movement is a vector quantity or a scalar quantity. Justify your answer.

[1 markah]

[1 mark]

- (b) Seterusnya, zarah itu bergerak ke titik C. Pada Rajah 1, lukis dan nyatakan vektor $\overrightarrow{BC}$ dalam sebutan $\underline{i}$ dan $\underline{j}$.

Next, the particle moves to point C. On Diagram 1, draw and express the vector $\overrightarrow{BC}$ in terms of $\underline{i}$ and $\underline{j}$.

[2 markah]

[2 marks]

- (c) Cari magnitud dan nyatakan arah vektor $\overrightarrow{BC}$.

Find the magnitude and state the direction of vector $\overrightarrow{BC}$.

[3 markah]

[3 marks]

Jawapan / Answer:

- 3 (a) Diberi bahawa sebutan ke- n bagi suatu jangjang geometri ialah $T_n = \frac{7}{3} (4)^{2n-1}$.

Given that the n^{th} term of a geometric progression is $T_n = \frac{7}{3} (4)^{2n-1}$.

Cari

Find

- (i) sebutan pertama,
the first term,
- (ii) nilai n jika $T_n = \frac{1835008}{3}$
the value of n if $T_n = \frac{1835008}{3}$

[3 markah]

[3 marks]

- (b) 4.2818181... boleh diungkapkan dalam bentuk pecahan tunggal $\frac{m}{110}$. Cari nilai m dengan menggunakan rumus S_{∞} .

4.2818181... can be expressed as a single fraction $\frac{m}{110}$. Find the value of m using the formula of S_{∞} .

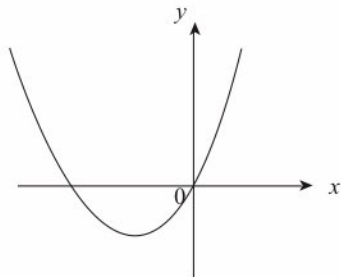
[2 markah]

[2 marks]

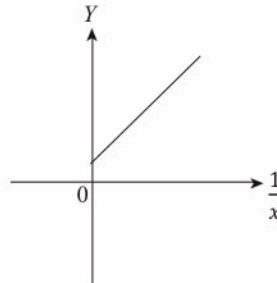
Jawapan / Answer:

- 4 Rajah 2.1 menunjukkan sebahagian daripada lengkung bagi $y = 2x^2 + 4x$. Rajah 2.2 menunjukkan graf garis lurus yang diperoleh dengan memplot Y melawan $\frac{1}{x}$, apabila $y = 2x^2 + 4x$ diungkapkan dalam bentuk linear.

Diagram 2.1 shows part of the curve $y = 2x^2 + 4x$. Diagram 2.2 shows a straight line graph obtained by plotting Y against $\frac{1}{x}$ when $y = 2x^2 + 4x$ is expressed in the linear form.



Rajah 2.1
Diagram 2.1



Rajah 2.2
Diagram 2.2

- (a) Cari nilai kecerunan dan pintasan-X bagi garis lurus tersebut.
find the value of gradient and the X-intercept for the linear graph.
- (b) Seterusnya, lakarkan satu graf linear baru dengan pintasan-Y dari (a) dan paksi $-\frac{1}{x^2}$.
Hence, sketch a new linear graph with the Y-intercept from (a) and $\frac{1}{x^2}$ axes.

[3 markah]

[3 marks]

[1 markah]

[1 mark]

Jawapan/ Answer:



- 5 (a) Persamaan $px + q - (x^2 + 3x - 4) = 0$, dengan keadaan p dan q ialah pemalar, mempunyai punca – punca α dan β .

The equation $px + q - (x^2 + 3x - 4) = 0$, such that p and q are constants, has roots α and β .

Nyatakan hasil tambah punca dan hasil darab punca dalam sebutan p dan / atau q .

State sum of roots and product of roots in terms of p and / or q .

[2 markah]

[2 marks]

- (b) Diberi α dan β adalah punca – punca bagi persamaan kuadratik $x^2 - 7x + 7 = 10$. Bentuk satu persamaan kuadratik yang baharu yang mempunyai punca – punca $\frac{2}{\alpha}$ dan $\frac{2}{\beta}$.

Given that α and β are the roots of the quadratic equation $x^2 - 7x + 7 = 10$. Form a new quadratic equation whose roots are $\frac{2}{\alpha}$ and $\frac{2}{\beta}$.

[4 markah]

[4 marks]

Jawapan/ Answer:

- 6 Lukis graf bagi pasangan persamaan $2x + 2y = 4$ dan $x^2 - 2x + 3y = 2$ dengan domain $-2 \leq x \leq 5$. Seterusnya, tentukan penyelesaian persamaan serentak tersebut.

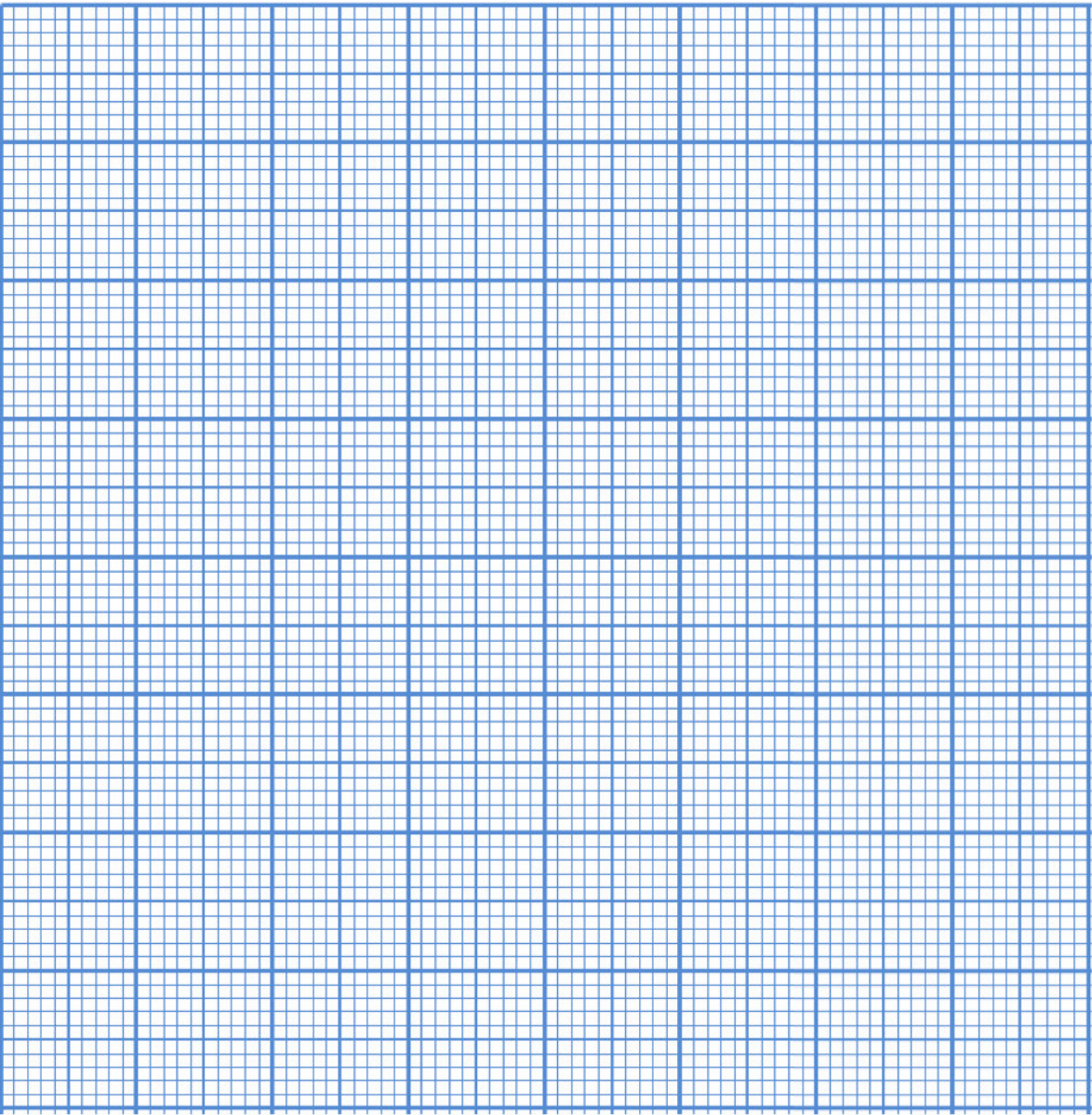
Draw a graph for the pair of equations $2x + 2y = 4$ and $x^2 - 2x + 3y = 2$ with the domain $-2 \leq x \leq 5$. Hence, determine the solutions of the simultaneous equations.

[6 markah]

[6 marks]

Jawapan/ Answer:

x	- 2	- 1	0	1	2	3	4	5
$2x + 2y = 4$								
$x^2 - 2x + 3y = 2$								

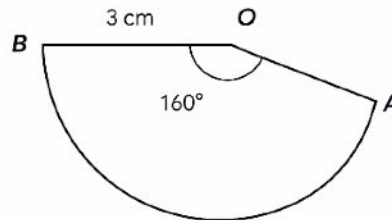


- 7 (a) Panjang lengkok minor PQ bagi sektor POQ berpusat O adalah sama dengan jejariinya. Labelkan sudut yang dicangkum pada pusat O pada ruangan jawapan.
The length of the minor arc PQ of sector POQ with center O is equal to its radius. Label the angle subtended at the center O in the answer space.

[1 markah]

[1 mark]

- (b) Rajah 3 menunjukkan sebuah sektor OAB dengan pusat O .
The diagram 3 shows the sector OAB with centre O .



Rajah 3
Diagram 3

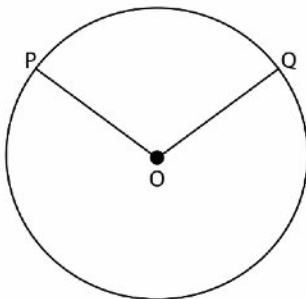
Cari perimeter dalam cm, sektor OAB .
Find, the perimeter, in cm, of the sector OAB .
 [Guna / Use $\pi = 3.142$]

[4 markah]

[4 marks]

Jawapan/ Answer:

(a)



- 8 (a) Cari nilai $\lim_{x \rightarrow 5} \frac{5-x}{x^2-25}$
Find the value of $\lim_{x \rightarrow 5} \frac{5-x}{x^2-25}$

[2 markah]

[2 marks]

- (b) Diberi fungsi $f(x) = 4x^2 - 3x + 7$, dengan menggunakan Prinsip Pertama, cari nilai $f'(x)$.
Given the function $f(x) = 4x^2 - 3x + 7$, using the First Principle, find $f'(x)$.

[2 markah]

[2 marks]

Jawapan/ Answer:

- 9 Diberi $\int_0^1 f(x) \, dx = -3$. Cari nilai
Given $\int_0^1 f(x) \, dx = -3$. Find the value of

$$\int_1^0 [3f(x) - 8x] \, dx$$

[4 markah]

[4 marks]

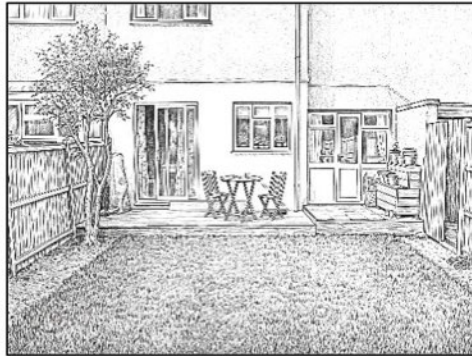
Jawapan / Answer:

- 10 (a) Diberi $3^{3x} = p$, $3^y = q$ dan $27^{x+y} = 10 + 27^x$. Ungkapkan p dalam sebutan q .
Given $3^{3x} = p$, $3^y = q$ and $27^{x+y} = 10 + 27^x$. Express p in term of q .

[3 markah]

[3 marks]

- (b) Sarah telah membeli rumput tiruan untuk hiasan halaman rumahnya yang berbentuk segiempat tepat dengan keadaan panjang halaman rumah adalah kuasa dua lebarnya seperti dalam Rajah 4(b). Diberi bahawa lebar rumput tiruan yang diperlukan adalah $(5 - \sqrt{2})$.
Sarah bought artificial grass to decorate her rectangle yard, where the length of yard is square of the width as shown in Diagram 4(b). Given that width of artificial grass needed is $(5 - \sqrt{2})$.



Rajah 4(b)

Diagram 4(b)

Cari luas halaman rumah Sarah dalam bentuk $a + b\sqrt{c}$.

Find the area of yard of Sarah's house in form $a + b\sqrt{c}$.

[4 markah]

[4 marks]

Jawapan / Answer:

- 11 (a) Sebiji dadu adil dilambungkan sebanyak tiga kali. Diberi X ialah pemboleh ubah rawak yang mewakili bilangan kali mendapat nombor 4.
A fair die is tossed three times. Given that X is a random variable representing the number of times the number 4 is obtained.

Tentukan sama ada peristiwa tersebut adalah pemboleh ubah rawak diskret atau pemboleh ubah rawak selanjar. Jelaskan.

Determine whether the event is a discrete random variable or a continuous random variable. Explain.

[1 markah]

[1 mark]

- (b) Berat jambu batu yang baru dikutip oleh Encik Azrul mengikut taburan normal dengan min, μ dan sisihan piawai, σ . Diberi bahawa 2.28% buah jambu batu itu mempunyai berat kurang daripada 1.5 kg dan 25.23% buah jambu batu mempunyai berat lebih daripada 3.5 kg.

The weight of guavas freshly picked by Mr. Azrul follows a normal distribution with a mean, μ and a standard deviation, σ . It is given that 2.28% of the guavas weigh less than 1.5 kg and 25.23% of the guavas weigh more than 3.5 kg.

Cari μ dan σ .

Find μ and σ .

[5 markah]

[5 marks]

Jawapan / Answer:



- 12 (a) (i) Lima orang murid duduk bersama-sama mengelilingi sebuah meja bulat. Cari bilangan cara berlainan mereka boleh duduk.
Five students are seated around a circular table. Find the number of different possible arrangements.
[1 markah]
[1 mark]
- (ii) Cari bilangan susunan berbeza yang mungkin bagi semua huruf dalam perkataan **PERMATA** jika semua huruf vokal sentiasa bersama.
*Find the number of different arrangements that can be formed using all the letters in the word **PERMATA** if all the vowels are always together.*
[2 markah]
[2 marks]
- (b) Puan Aina ingin memilih 3 jenis bunga daripada 5 jenis bunga ros dan 4 jenis bunga orkid. Cari bilangan cara memilih sekurang-kurangnya satu bunga ros dan satu bunga orkid.
Mrs. Aina wants to choose 3 types of flowers from 5 types of roses and 4 types of orchids. Find the number of ways to choose flowers if at least one rose and one orchid must be selected.
[3 markah]
[3 marks]

Jawapan / Answer:



Bahagian B

[16 markah]

Jawab **dua** dari tiga soalan.

- 13** Diberi bahawa fungsi $f(x) = 2x - 4$ dan fungsi gubahan $gf(x) = \frac{2}{5x-4}, x \neq \frac{4}{5}$.

It is given that the function $f(x) = 2x - 4$ and the composite function $gf(x) = \frac{2}{5x-4}, x \neq \frac{4}{5}$.

- (a) Cari $g(x)$.

Find $g(x)$.

[3 markah]

[3 marks]

- (b) (i) Lakar graf $y = |f(x)|$ untuk domain $-1 \leq x \leq 5$. Nyatakan julat yang sepadan dengan domain yang diberi.

Sketch the graph of $y = |f(x)|$ for the domain $-1 \leq x \leq 5$. State the range that corresponds to the given domain.

[3 markah]

[3 marks]

- (ii) Seterusnya, cari domain bagi $|f(x)| > 2$.

Hence, find the domain of $|f(x)| > 2$.

[2 markah]

[2 marks]

Jawapan / Answer:

- 14 Sebuah bot P meninggalkan jeti O dengan halaju $v_P = 5\mathbf{i} + 4\mathbf{j} \text{ km j}^{-1}$. Pada masa yang sama, sebuah bot Q bergerak dari jeti A dengan halaju $v_Q = 3\mathbf{i} + 2\mathbf{j} \text{ km j}^{-1}$. Diberi vektor kedudukan jeti A ialah $\overrightarrow{OA} = 20\mathbf{i} + 20\mathbf{j}$.

A boat P leaves jetty O with a velocity of $v_P = 5\mathbf{i} + 4\mathbf{j} \text{ km j}^{-1}$. At the same time, a boat Q travels from jetty A with a velocity of $v_Q = 3\mathbf{i} + 2\mathbf{j} \text{ km j}^{-1}$. Given that the position vector of jetty A is $\overrightarrow{OA} = 20\mathbf{i} + 20\mathbf{j}$.

- a) Nyatakan sesaran dan vektor kedudukan bot Q selepas t jam.

State the displacement and the position vector of boat Q after t hours.

[3 markah]

[3 marks]

- b) Hitung masa, dalam jam, apabila bot P dan bot Q bertemu.

Calculate the time, in hours, when boats P and Q meet.

[2 markah]

[2 marks]

- c) Cari jarak titik pertemuan itu dari jeti O .

Find the distance of the meeting point from the jetty O .

[3 markah]

[3 marks]

Jawapan / Answer:

- 15 Diberi bahawa $\sin \theta = \frac{3}{5}$ dan θ ialah sudut tirus.
Given that $\sin \theta = \frac{3}{5}$ and θ is an acute angle.

- (a) Cari nilai tepat bagi $\cos \theta$.
Find the exact value of $\cos \theta$.

[1 markah]

[1 mark]

- (b) Dengan menggunakan rumus sudut berganda, cari nilai tepat bagi $\sin 2\theta$ dan $\cos 2\theta$.
Using the double-angle formula, find the exact values of $\sin 2\theta$ and $\cos 2\theta$.

[4 markah]

[4 marks]

- (c) Seterusnya, dengan menggunakan rumus sudut majmuk, hitung nilai tepat bagi $\sin 3\theta$.
Hence, using the compound-angle formula, find the exact value of $\sin 3\theta$.

[3 markah]

[3 marks]

Jawapan / Answer:

KERTAS PEPERIKSAAN TAMAT



[Lihat halaman sebelah
SULIT

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	1	2	3	4	5	6	7	8	9
											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	.4129	.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	14	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		.00990	.00964	.00939	.00914			0	1	1	1	1	2	2	2	2
									.00889	.00866	.00842	2	5	7	9	12	14	16	18
2.4	.00820	.00798	.00776	.00755	.00734							2	4	6	8	11	13	15	17
						.00714	.00695	.00676	.00657	.00639		2	4	6	7	9	11	13	15
2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480	2	3	5	6	8	9	11	12	14
2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357	1	2	3	5	6	7	8	9	10
2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264	1	2	3	4	5	6	7	8	9
2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193	1	1	2	3	4	4	5	6	6
2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139	0	1	1	2	2	3	3	4	4
3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100	0	1	1	2	2	2	3	3	4

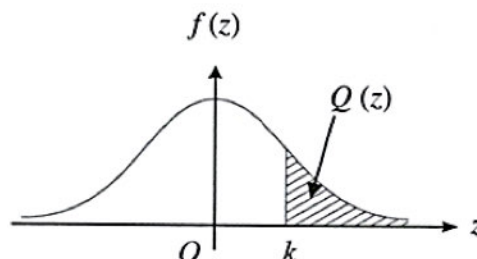
Bagi z negatif guna hubungan:

For negative z use relation:

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

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

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



Contoh / Example:

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

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

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

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