

Module 3

Answer all questions.

1. Function f is defined by

$$f(x) = \begin{cases} |2-x|, & x \leq 3 \\ \frac{11}{2} - \frac{3}{2}x, & x \geq 3 \end{cases}$$

Find the range corresponding to the domain $0 \leq x \leq 4$

[3 marks]

Answer :

1

3

2. Given the function $f: x \rightarrow 2x + 5$, $g: x \rightarrow \frac{x+2}{5}$ and $fg: x \rightarrow \frac{mx+n}{5}$, where m and n are constants, find the value of m and of n ,

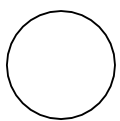
[2 marks]

Answer : $m = \dots\dots\dots$

$n = \dots\dots\dots$

2

2



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3. Diagram 1 shows part of the mapping of x to z by the function $f : x \rightarrow ax + b$ followed by the function $g : y \rightarrow \frac{12}{y - c}, y \neq c$. Calculate the values of a , b , c and d .

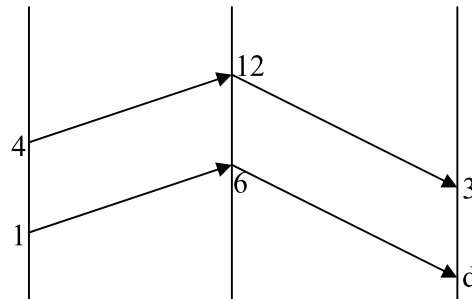


Diagram 1

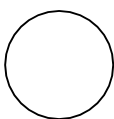
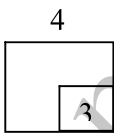
[4 marks]

Answer: $a = \dots\dots\dots b = \dots\dots\dots c = \dots\dots\dots d = \dots\dots\dots$

4. If the x -axis is a tangent to the curve $x^2 + 3px = p - 3$, find the values of p .

[3 marks]

Answer : $p = \dots\dots\dots$



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5. Given α and β are the roots of $2x^2 - 4x + 1 = 0$. Form the quadratic equation with roots α^2 and β^2 .

[4 marks]

Answer :

5

4

-
6. Given the quadratic function of $f(x) = 6x - 1 - 3x^2$.
- a) Express the quadratic function $f(x)$ in the form $k + m(x + n)^2$, where k , m and n are constants.
- b) write the equation of the axis of symmetry

[3 marks]

Answer : (a)

(b)

6

3

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7. Find the range of values of x if $f(x) = 3x^2 + 2x - 5$ always positive.

[3 marks]

7

3

Answer :

8. Simplify and state your answer in the simplest form $5^{3n+1} + 5^{3n-2} - 125^{n-1}$.

[2 marks]

8

3

Answer :

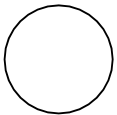
9. Solve the equation $9^{y+1} = 24 + 9^y$.

[3 marks]

9

3

Answer :



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10. Given $2 + \log_3 k = \log_9(m + 3)$, express k in terms of m .

[4 marks]

Answer :

10

4

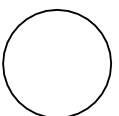
11. Solve the equation $\log_3 x = \log_9(2x + 3)$

[3 marks]

Answer:

11

3



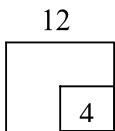
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12. Given that the n^{th} term, $T_n = 20 - 4n$ for an arithmetic progression. Find the sum of the first 12 terms of the progression.

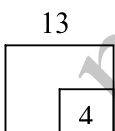
[3 marks]



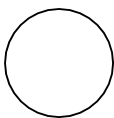
Answer:

13. Given the sum of the first 3 terms of a geometric progression is 567 and the sum of the next three terms of the progression is -168 . Find the sum to infinity of the progression.

[4 marks]



Answer :



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14. Given that the sum of the first three terms of a geometric progression is 13 times the third term of the progression. If the common ratio, $r > 0$, find the common ratio.
[2 marks]

Answer :

14

2

15. Diagram 2 shows the graph of $\log_2 y$ against $\log_2 x$. Values of x and values of y are related by the equation $y = \frac{x^{2n}}{k}$, where n and k are constants.
Find the value of n and the value of k .

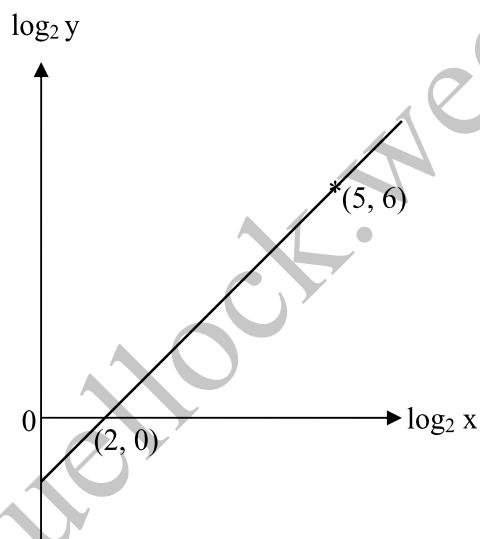


Diagram 2

[4 marks]

Answer : $n = \dots\dots\dots k = \dots\dots\dots$

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16. Diagram 3 shows a semicircle KLMN, of diameter KLM, with centre L.

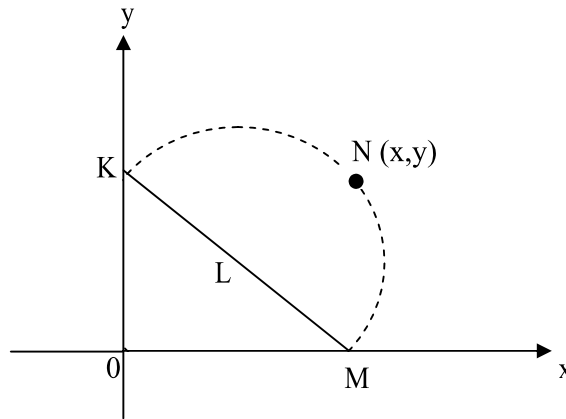


Diagram 3

Given that the equation of the straight line KLM is $\frac{x}{4} + \frac{y}{3} = 1$ and point N(x , y) lies on the circumference of a circle KLMN , find the equation of the locus of the moving point N.

[3 marks]

16

3

Answer:

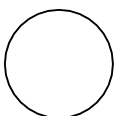
17. If $\underline{a} = 2i + (p + 1)j$ and $\underline{b} = -3i + 6j$, find the value of p if $\underline{a} + \underline{b}$ is parallel to the x-axis.

[3 marks]

17

4

Answer:



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18. Given that $\sin 20^\circ = a$ and $\cos 30^\circ = b$, express $\sin 50^\circ$ in terms of a and

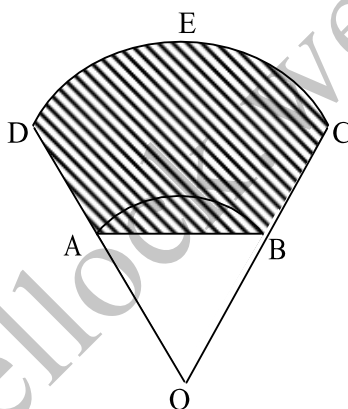
[3 marks]

Answer:

18

3

19. Diagram below shows two sectors, OAB and OCD with centre O.



Given that $\angle COD = 0.92$ rad, $BC = 5$ cm and perimeter of sector OAB is 20.44 cm. Using $\pi = 3.142$, find the area of the shaded region of ABCED.

[3 marks]

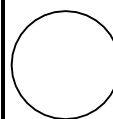
19

3

Answer:.....

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20. Given that $y = \frac{2x-1}{x^2}$ and $\frac{dy}{dx} = 2g(x)$ where $g(x)$ is a function in x .

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

[3 marks]

20

3

Answer:

21. The gradient of the curve $y = hx + \frac{k}{x^2}$ at the point $\left(-1, \frac{7}{2}\right)$ is 2. Find the value of h and the value of k .

[3 marks]

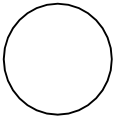
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Answer:

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22. A coach wish to choose a player from two bowlers to represent the nation in a tournament. The following data show the number of pins scored by the two players in six successive bowls:

Player A: 8, 9, 8, 9, 8, 6

Player B: 7, 8, 8, 9, 7, 9

By using the values of mean and standard deviation, determine the player which qualified to be chosen because the score is consistent.

[3 marks]

Answer:

22

3

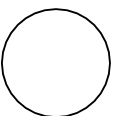
23. In a debate competition, the probability of team A, team B and team C will qualify for the final are $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ respectively. Find the probability that at least 2 teams will qualify for the final.

[3 marks]

Answer:

23

3



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24. The letters of the word GROUPS are arranged in a row. Find the probability that an arrangement chosen at random
- (a) begins with the letter P,
 - (b) begins with the letter P and ends with a vowels.

[3 marks]

24

3

Answer: (a).....

(b).....

25. The life span of certain computer chip has a normal distribution with a mean of 1500 days and a standard deviation of 40 days.
- a) Calculate the probability that a computer chip chosen at random has a life span of more than 1540 days
 - b) Given that 6% of the computer chips have a life span of more than n days, find the value of n.

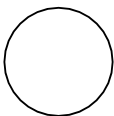
[4 marks]

25

4

Answer : (a).....

(b).....



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END OF QUESTION PAPER

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