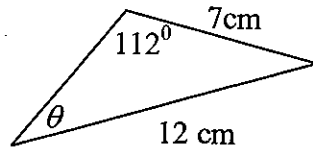


Question 1 (10 marks)

10/10

Marks

- a) Find θ , correct to the nearest minute. 2



- b) Find the exact value of $\cos 210^\circ$ 2

- c) Find $\tan \theta$ if $\sin \theta = \frac{2}{5}$ and θ is obtuse. 2

- d) Solve for x , given $\sin x = \frac{\sqrt{3}}{2}$ for $0^\circ \leq x \leq 360^\circ$. 2

- e) Find the exact value of $\tan -240^\circ$ 2

Question 2 (10 marks) Start this question on a new page.

10/10

- a) Simplify $\frac{1}{x^2 - 1} - \frac{1}{x^2 - 2x + 1}$. 2

- b) Factorise :

(i) $6x - 2y - 3x^2 + 2xy$ 4

(ii) $6x^2 + x - 2$

(iii) $2x^3 + 16y^3$

- c) Solve $3x^2 - 4x - 5 = 0$ giving the solution in simplest surd form. 2

- d) Find values for x and y if $x + y\sqrt{2} = \frac{1}{2\sqrt{2} - 3}$. 2

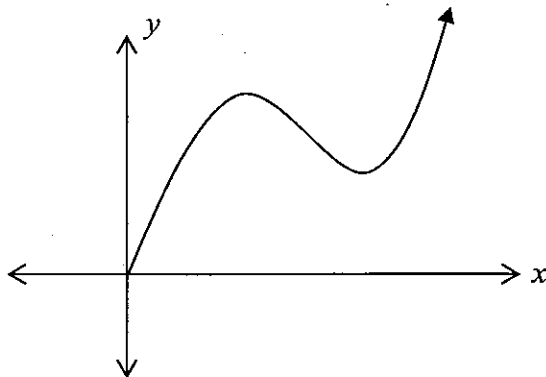
Question 3 (11 marks) Start this question on a new page. 11/11

Marks

- a) Find the angle of inclination of the line $\sqrt{3}x + y - 5 = 0$. 2
- b) Find the coordinates of the point P which divides the interval AB externally in the ratio 2:5, given A is (2,1) and B is (-1,7). 2
- c) Given the points P (-2,3), Q (0,8) and R (4, 7): 7
- Find the coordinates of M, the midpoint of PR.
 - Find the gradient of PR.
 - Find the equation of the line perpendicular to PR, passing through M, in general form.
 - Find the coordinates of S if PQRS is a parallelogram.

Question 4 (10 marks) Start this question on a new page. 7/10

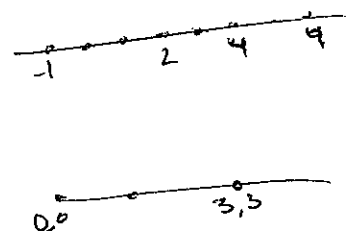
- a) Copy and complete the graph to form an odd function. 1



- b) What is the natural domain of the function $f(x) = \sqrt{9 - x^2}$. 1

- c) Given $f(x) = \begin{cases} 2x & x < -1 \\ x-1 & -1 \leq x \leq 4 \\ 3 & x > 4 \end{cases}$ 3

- Sketch $f(x)$.
- Evaluate $f(-3) + 2f(0) + f(6)$



Question 4 continued**Marks**

- d) Given $f(x) = 3 - x^2$, express $\frac{f(x+h) - f(x)}{h}$ in its simplest form. 2
- e) For the function $f(x) = \frac{4x}{2x-1}$, as x approaches ∞ , what value does $f(x)$ approach? 1
- f) Find the minimum value of $f(x) = 2x^2 - 3x - 5$. 2

Question 5 (12 marks) Start this question on a new page.

11/12

- a) Solve simultaneously: $2x - 3y = 12$ and $5x + 2y = 11$. 3
- b) Solve for x :
- (i) $x^3 - x^2 - 12x \leq 0$ 2
- (ii) $\frac{2x}{x-3} \leq 5$ 4
- (iii) $|2x-1| - x < 0$ 3

Question 6 (13 marks) Start this question on a new page.

11/13

- a) Sketch, indicating any intercepts, asymptotes or other important features: 6
- (i) $y = \sqrt{1-x}$
- (ii) $y = |x-2| + 1$
- (iii) $f(x) = \frac{x^2-9}{x-3}$
- b) (i) Show that $\frac{x-2}{x+2} = 1 - \frac{4}{x+2}$. 1
- (ii) Hence or otherwise sketch $y = \frac{x-2}{x+2}$ indicating any intercepts or asymptotes. 3
- c) Sketch $x^2 + y^2 - 4x + 6y + 9 = 0$, showing all important features. 3

Question 7 (14 marks) Start this question on a new page. 13/14 **Marks**

- a) Solve for $0^\circ \leq \theta \leq 360^\circ$ 7
- (i) $\sqrt{3} \cos \theta = \sin \theta$
- (ii) $2 \sin^2 \theta + \cos \theta - 2 = 0$
- b) A boat sails from point A on a bearing of 053° for 3 km to point B, 5
then sails to point C on a bearing of 200° for 9 km.
- (i) Draw a diagram and explain why $\angle ABC = 33^\circ$.
- (ii) On what bearing, to the nearest degree, must the boat sail to return to the point A
- c) Prove the identity: $\frac{1 + \cos^2 \theta}{\sin^2 \theta} = 2 \operatorname{cosec}^2 \theta - 1$. 2

End of Paper.