1. Solve, for $0 \leq \theta \leq 2\pi$, the equation $6\sin^2\theta - \cos\theta = 4$ [7]

Total 7 marks

2. Prove that $tanA \equiv \frac{1-\cos2A+\sin2A}{1+\cos2A+\sin 2A}$.   [5]

Total 5 marks

3. Given that $sinA = \frac{12}{13}$ and $sinB = \frac{4}{5}$, where A and B are both acute angles, find the exact value of

   $sin(A - B)$.   [6]

Total 6 marks

4. Express $sinx + \sqrt{3}cosx$ in the form $Rsin(x + \alpha)$, where $R > 0$ and $0° \leq \alpha \leq 90°$, giving the exact

   value of R and the values of α correct to 1 decimal place.

   Hence solve the equation $inx + \sqrt{3}cosx + 1 = 0$ for $0° \leq x \leq 360°$.   [6]

Total 6 marks

5. i) The centre of a circle is $(-2,3)$ and a point on the circumference is $(-5, -1)$. Find the equation of the

   circle.   [4]

   ii) Determine the equation of the tangent to the circle at the point $(-5, -1)$.   [4]

   iii) Find the points of intersection of the circle in part i) with the circle with equation

   $x^2 + y^2 + 6x - 7y - 10 = 0$ [6]

6. i) Determine the vector equation of the line joining the points $(2, 3, -2)$ and $(0, 7, -1)$.

[3]

ii) Find the point of intersection of the straight line with equation $r = \begin{pmatrix} -6 \\ -3 \\ 1 \end{pmatrix} + \mu \begin{pmatrix} 5 \\ 1 \\ -2 \end{pmatrix}$ intersects

the line from part i). [5]

iii) Determine the angle between the two lines. [3]

Total 11 marks

7. With respect to an origin O, the points A and B have position vectors $a = -4i + 4j - k$ and

$b = 5i - 2j + 11k$ respectively.

i) Find the distance between the points A and B. [3]

ii) Find the equation of the plane π passing through the point $2i + j - 4k$ and perpendicular to

$-i + j + 2k$. [3]

iii) Find the angle between the line AB and the plane π. [5]

Total 11 marks

END OF TEST

Answers

1. $2.30, 3.98, \frac{\pi}{3}, \frac{5\pi}{3}$

2. Proof

3. $\frac{16}{65}$

4. $2\sin(x + 60^0), 150^0, 270^0$

5. i) $(x + 2)^2 + (y - 3)^2 = 25$

   ii) $y = -\frac{3}{4}x - \frac{19}{4}$ or $4y = -3x - 19$ iii) $(2, 6)(-2, -2)$

6. i) $\begin{pmatrix} 2 \\ 3 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -4 \\ -1 \end{pmatrix}$ ii) $(4, -1, -3)$ iii) 71.4^0

7. i) $\sqrt{261}$ or 16.2 units   ii) $r.\begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix} = -7$ iii) 13.1^0