

1. (a) By writing $\sin 3\theta$ as $\sin (2\theta + \theta)$, show that

$$\sin 3\theta = 3\sin \theta - 4\sin^3 \theta.$$

(5)

- (b) Given that $\sin \theta = \frac{\sqrt{3}}{4}$, find the exact value of $\sin 3\theta$.

(2)

(a) Show that $f(x) = \frac{x^2 + x + 1}{(x + 2)^2}$, $x \neq -2$.

(4)

(b) Show that $x^2 + x + 1 > 0$ for all values of x .

(3)

(c) Show that $f(x) > 0$ for all values of x , $x \neq -2$.

(1)



(6)

$$y = (1 + e^{2x})^{\frac{3}{2}},$$

(5)

Question 4 continued



$$y = \sqrt{3} \cos x + \sin x.$$

- (a) Express the equation of the curve in the form $y = R \sin(x + \alpha)$, where R and α are constants, $R > 0$ and $0 < \alpha < \frac{\pi}{2}$. **(4)**

- (b) Find the values of x , $0 \leq x < 2\pi$, for which $y = 1$.

(4)



Q5

Turn over

(Total 8 marks)





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blank**Question 6 continued**

$$f(x) = x^4 - 4x - 8.$$

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Question 7 continued

Q7

(Total 13 marks)



Question 8 continued

(Total 6 marks)

END