

Question Three

- (a) Sketch the curve $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$, indicating its important features. (4 marks)
- (b) If $y = 2 \cos x$ evaluate $\frac{d^2y}{dx^2}$ when $x = 2\pi$ (3 marks)
- (c) Solve the trigonometric equation $3 \cos x - 1 = 0$ for $0^\circ \leq x \leq 360^\circ$
Indicate how you could have used part (a) to estimate your answer. (6 marks)
- (d) Factorise completely,
- (i) $\cos^3 x - \sin^3 x$
- (ii) $\cos^3 x + \sin^3 x$ (4 marks)
- (e) Simplify $\frac{\cos x \sin^2 x}{\sin x \cos^2 x} \div \frac{\sin^2 x \cos^2 x}{\tan x}$
expressing your answer only in terms of $\cos x$ (4 marks)
- (f) By writing $\tan x$ as $\frac{\sin x}{\cos x}$, use the Quotient Rule of differentiation
to prove if $y = \tan x$ then $\frac{dy}{dx} = \sec^2 x$ (4 marks)