

ACHA 4006

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Exam 2

1. i) $y = 5x^4 + 5x^2 + 3x - 19$

$$\frac{dy}{dx} = 20x^3 + 10x + 3$$

ii) $y = (2x+5)(x-1)$
 $y = 2x^2 + 3x - 5$

$$\frac{dy}{dx} = 4x + 3$$

iii) $y = \frac{1}{x^6} - \cos 5x$

$y = x^{-6} - \cos 5x$

$$\frac{dy}{dx} = -6x^{-7} + 5\sin 5x$$

iv) $y = e^{2x} \sin 3x$

$$\frac{dy}{dx} = 2e^{2x} 3\cos 3x$$

v) $y = \frac{\tan 7x}{\sin x}$

$$\frac{dy}{dx} = \frac{7\sec^2 7x}{\cos x}$$

vi) $y = \sqrt{6x^2 - 3x + 5}$
†

2. i) $\sin x = 0.43$

$x = \sin^{-1} 0.43$

$x = 25.5^\circ, 154.5^\circ$

ii) $85 \tan x = -7$

$\tan x = -\frac{7}{85}$

$x = \tan^{-1} -\frac{7}{85}$

$x = 125.5^\circ, 305.5^\circ$

iii) $5 \cos x = 3$

$\cos x = 0.6$

$x = \cos^{-1} 0.6$

$x = 53.1^\circ, 306.9^\circ$

3. i) $\sin 10$
 $\frac{10}{25}$

$\sin 10$
 $\frac{10}{25}$

ii) 105
 180

iii) $\frac{7}{5}$

4. $y =$

$y \theta$

$\frac{y \theta}{t}$

$\frac{y \theta}{t}$

$\sqrt{\frac{y \theta}{t}}$

↑

$$3. i) \frac{\sin 105}{23} = \frac{\sin 18}{18} \sin \left(\frac{\sin 105}{23} \times 18 \right) = 49.1^\circ$$

$$\frac{\sin 105}{23} \times 18 =$$

$$ii) 105 + 49.1 = 154.1$$

$$180 - 154.1 = 25.9^\circ$$

$$iii) \frac{23}{\sin 105} \times \sin(25.9) = 10.4 \text{ m}$$

$$4. y = \frac{t(x^2 + R)}{0}$$

$$y\theta = t(x^2 + R)$$

$$\frac{y\theta}{t} = x^2 + R$$

$$\frac{y\theta}{t} - R = x^2$$

$$\sqrt{\frac{y\theta}{t} - R} = x$$

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$$5.1) 3^{x+4} = 7^x$$

$$(x+4)\log 3 = x\log 7$$

$$(x+4)0.48 = 0.85x$$

$$0.48x + 1.92 = 0.85x$$

$$1.92 = 0.37x$$

$$x = 5.19$$

$$ii) \log(x+5) + \log(x+2) = \log(x+7) + \log(x+6)$$

$$\log(x+5)(x+2) = \log(x+7)(x+6)$$

$$(x+5)(x+2) = (x+7)(x+6)$$

$$x^2 + 7x + 10 = x^2 + 13x + 42$$

$$7x + 10 = 13x + 42$$

$$10 = 6x + 42$$

$$-32 = 6x$$

$$-5.3 = x$$

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$$6. i) \int x^8 + 4x^3 + 5x - 1 \, dx$$

$$\frac{x^9}{9} + \frac{4x^4}{4} + \frac{5x^2}{2} - 1x + C$$

$$ii) \int 5x^2(x^3 + 2x + 1) \, dx$$

$$\int 5x^6 + 10x^3 + 5x^2 \, dx$$

$$\frac{5x^7}{7} + \frac{10x^4}{4} + \frac{5x^3}{3} + C$$

$$iii) \int 5 \sin 3x \, dx$$

$$- \frac{5}{3} \cos 3x + C$$

$$iv) \int_0^5 (x+5)(x+1) \, dx$$

$$\int_0^5 x^2 + 6x + 5 \, dx$$

$$\left[\frac{x^3}{3} + \frac{6x^2}{2} + 5x \right]_0^5$$

$$\left[\frac{5^3}{3} + \frac{6 \times 5^2}{2} + 25 \right] - \left[\frac{0^3}{3} + \frac{6 \times 0^2}{2} + 5 \times 0 \right] = 141.67$$