

Q1)

a) $y^2 = 4(x^2 - 1)$

$$y^2 = 4x^2 - 4$$

$$y^2 + 4 = 4x^2$$

$$\sqrt{\frac{y^2 + 4}{4}} = x$$

$$y = 10, x = \sqrt{26} = \underline{\underline{5.10}}$$

③

b) (i) $\frac{8x+1}{6} = \frac{2x+3}{2}$

$$16x + 2 = 12x + 18$$

$$4x = 16$$

$$x = 4$$

(ii) $\frac{x+5}{2} = \frac{x}{4} - \frac{5x-1}{2}$

x 4

$$2(x+5) = x - 2(5x-1)$$

$$2x+10 = x - 10x + 2$$

$$11x = -8$$

$$x = \frac{-8}{11} = \underline{\underline{0.73}}$$

(ii)

$$2\ln(x+8) = \ln(x+1) + \ln(x+2)$$

$$x^2 + 16x + 64 = x^2 + 3x + 2$$

$$13x = -62$$

$$x = \underline{\underline{4.77}}$$

$$(iv) \quad 2^x \times 3 = 5^{x+2}$$

$$\ln 2^x + \ln 3 = \ln 5^{x+2}$$

$$x \ln 2 + \ln 3 = (x+2) \ln 5$$

$$0.69x + 1.10 = 1.61x + 3.22$$

$$-2.12 = 0.92x$$

$$\boxed{-2.30 = x}$$

(16)

$$d) (i) (3x+1)(x+4) = 0$$

$$\boxed{x = -1/3} \quad \boxed{x = -4}$$

$$(ii) (x+8)(x+2) = 0$$

$$\boxed{x = -8} \quad \boxed{x = -2}$$

$$(iii) (x+8)(x-8) = 0$$

$$\boxed{x = \pm 8}$$

(10)

$$(iv) (2x+1)(x+3) = 0$$

$$\boxed{x = -1/2} \quad \boxed{x = -3}$$

$$e) (x+7)(x-1) - (x^2+3) = 2$$

$$x^2 + 6x - 7 - x^2 - 3 = 2$$

$$6x - 10 = 2$$

$$6x = 12$$

$$\boxed{x = 2}$$

(4)

Q2)

a)

$$x = \frac{-2 \pm \sqrt{2^2 - 4(14)(-9)}}{2(14)}$$

$$x = \frac{-2 \pm 22.54}{28}$$

$$x = 0.73$$

$$x = -0.88$$

7

b) (i) $\sin x = 0.6$

S	A
T	C

$$x = 36.87^\circ, 143.13^\circ$$

(ii) $\csc x = -1/3$

ignore -ve :

$$x = 19.47$$

$$x = 340.53^\circ, 199.47^\circ$$

12

(iii) $\sin x = \frac{4}{7}$

$$x = 34.85^\circ, 145.15^\circ$$

c) $(x+2)(x+1)$

$(\tan x + 2)(\tan x + 1)$

S	A
T	C

$\tan x = -2$

ignore -ve

$x = 63.43$

$\tan x = -1$

ignore -ve

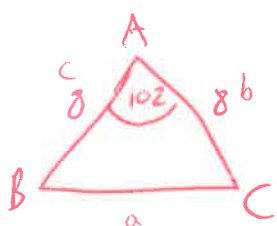
$x = 45$

$x = 116.57^\circ, 296.57^\circ$

$x = 135^\circ, 315^\circ$

(12)

d)



$(BC)^2 = 8^2 + 8^2 - 2(8)(8)\cos 102$

$(BC)^2 = 64 + 64 + 26.61$

$BC = \sqrt{154.61}$

$BC = 12.43 \text{ m}$

(5)

e) $\frac{2y+3}{\cot x} = 1$

$2y+3 = \cot x$

$2y+3 = \frac{1}{\tan x}$

$\tan x = \frac{1}{2y+3}$

(4)

Q3) a)

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

$$\frac{dy}{dx} = 9x^2 - 10x + 2$$

(ii) $y = 4(x+2)^2$

$$y = 4(x^2 + 4x + 4)$$

$$y = 4x^2 + 16x + 16$$

$$\frac{dy}{dx} = 8x + 16$$

(iii) $y = x^{1/2} + 6x^{-1}$

$$\frac{dy}{dx} = \frac{1}{2}x^{-1/2} - 6x^{-2}$$

(iv) $\frac{dy}{dx} = 5\cos 5x + 8\sin 2x + 9\sec^2 9x$

(v) $\frac{dy}{dx} = x^4 \cos x + \sin x (4x^3)$

(vii) $\frac{dy}{dx} = \frac{(e^{3x})(2x+4) - (x^2+4x+3)(3e^{3x})}{(e^{3x})^2}$

$$\frac{(e^{3x})(2x+4) - (x^2+4x+3)(3e^{3x})}{(e^{3x})^2}$$

(vii) $\frac{dy}{dx} = 6(6x^3 - 2x - 1)^5 (18x^2 - 2)$

(21)

$$b) \quad y = \cos 2x$$

$$\frac{dy}{dx} = -2 \sin 2x$$

$$\frac{d^2y}{dx^2} = -4 \cos 2x$$

$$\frac{d^3y}{dx^3} = 8 \sin 2x$$

$$\frac{d^4y}{dx^4} = 16 \cos 2x$$

(4)

$$c) \quad y = e^{2x}$$

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

$$\frac{d^2y}{dx^2} = 4e^{2x}$$

$$\frac{d^3y}{dx^3} = 8e^{2x}$$

(3)

$$d) \quad y = x + 4 \quad (1)$$

$$y = x^2 + 5x + 10 \quad (2)$$

$$(2) - (1)$$

$$0 = x^2 + 5x + 6$$

$$0 = (x+2)(x+3)$$

$$x = -2, -3$$

(6)

$$e) \quad z = x^3 + x^4 y^2 + y^5$$

$$\frac{\partial z}{\partial x} = 3x^2 + 4x^3 y^2$$

$$\frac{\partial^2 z}{\partial x^2} = 6x + 12x^2 y^2$$

$$\frac{\partial^2 z}{\partial y \partial x} = 8x^3 y$$

$$\frac{\partial z}{\partial y} = 2x^4 y + 5y^4$$

$$\frac{\partial^2 z}{\partial y^2} = 2x^4 + 20y^3$$

$$\frac{\partial^2 z}{\partial x \partial y} = 8x^3 y$$

(6)

