

Q1)

Q1)

(i)

$$(x+6)^2 + 2x = x^2 - 5$$

$$x^2 + 12x + 36 + 2x = x^2 - 5$$

$$14x = -41$$

$$x = -\frac{41}{14}$$

$$\underline{\underline{-\frac{41}{14}}}$$

(ii)

$$2^{x+5} = 6x$$

$$x+5 = \log_2(6)x$$

$$x = \log_2(6)x - 5 \quad x - \log_2(6)x = -5$$

$$(1 - \log_2(6))x = -5 \quad x = \frac{-5}{1 - \log_2(6)} \quad x = \frac{5}{1 - \log_2(6)}$$

$$x = -\frac{5}{1 - (\log_2(2) + \log_2(3))}$$

$$x = \frac{5}{\log_2(3)}$$

$$(ii) \quad 2 \log(x+3) = \log(x+5) + \log(x+8)$$

$$(x+3)^2 = (x+5)(x+8)$$

$$(x+3)(x+3)$$

$$x^2 + 6x + 9$$

$$(iv) \quad x - \frac{1 - \frac{6x}{5}}{3} = \frac{4 - \frac{x}{3}}{12} + \frac{5}{4}$$

$$180x \quad x - \frac{5-6x}{3} = \frac{12-x}{12} + \frac{5}{4} \quad \times 180$$

$$180x - 12(5-6x) = 5(12-x) + 225$$

$$180x - 60 + 72x = 5(12-x) + 225$$
$$= 60 - 5x + 225$$

$$252x - 60 = 285 - 5x$$

$$257x + 5x = 285 + 60$$

$$257x = 345$$

$$x = \frac{345}{257}$$

Q2)

Q2)

$$\begin{array}{rcl} 2x + 4y - 3z = 120 & \text{---} & 16y - 17z = 320 \\ 5x + 2y + z = 140 & \text{---} & 50y - 65z = -400 \\ x - 3y + 5z = 100 & \text{---} & 800y - 850z = 1600 \end{array}$$

$$\begin{array}{rcl} 10x + 20y - 15z = 600 & \text{---} & 80y - 1040z = -6400 \\ 10x + 4y + 2z = 280 & \text{---} & 190z = 22400 \\ 10x - 30y + 50z = 1000 & \text{---} & z = \frac{2240}{19} \end{array}$$

$$16y = 44160 \quad y = \frac{2760}{19}$$

$$x = 100 + 3y - 5z$$

$$x = \frac{-1020}{19}$$

Q3)

Q3)

$$0.6x^2 + 3.4x = 7.4$$

$$0.6x^2 + 3.4x - 7.4 = 0$$

$\begin{matrix} a & b & c \end{matrix}$

$$x = \frac{-3.4 \pm \sqrt{(3.4)^2 - 4(0.6)(-7.4)}}{2(0.6)}$$

$$x = \frac{-3.4 \pm \sqrt{79.32}}{1.2}$$

$$x = \frac{-3.4 \pm 8.91}{1.2}$$

$$x = \frac{-3.4 + 8.91}{1.2}$$

$$x = \frac{-3.4 - 8.91}{1.2}$$

$$\underline{\underline{x = 1.675}}$$

$$\underline{\underline{x = -7.34}}$$

Q4)

Q4)

$$(i) y = 5x^3 - 7x^2 + 5x - 1$$

$$\frac{dy}{dx} = 15x^2 - 14x + 5$$

$$(ii) y = -\frac{1}{x^2} \quad \begin{matrix} u = x^2 \\ v = x^2 \end{matrix} \quad \frac{du}{dx} = 0 \quad \frac{dv}{dx} = 5$$

$$\frac{dy}{dx} = \frac{(x^2)(0) - (-1)(5)}{(x^2)^2}$$

Q5)

Q5)

$$y = \frac{(5x^2 + 3x + 1)^5}{e^x} \quad \begin{matrix} \leftarrow U \\ \leftarrow V \end{matrix}$$

$$\frac{du}{dx} = 5(5x^2 + 3x + 1)^4$$

$$\frac{dv}{dx} = x e^x$$

$$\frac{dy}{dx} = \frac{(e^x)(5(5x^2 + 3x + 1)^4) - ((5x^2 + 3x + 1)^5)}{(x e^x)^2}$$

Q6)

Q6)

(i) $\sin x = \frac{2}{9}$

$\sin x = \frac{2}{9}$ $x = \sin^{-1}\left(\frac{2}{9}\right)$ $x = 12.84^\circ$