

$$\begin{aligned}
 \text{i) } y &= 3x^2 + 2x + 4 \\
 a &= 3 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 b &= 2 \\
 c &= 4 \\
 &= \frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times 4}}{2 \times 3} \\
 &= \frac{-2 \pm \sqrt{4 - 24}}{6} \\
 &= \frac{-2 \pm \sqrt{-20}}{6}
 \end{aligned}$$

N.P.

$\therefore$ no solutions

$$\begin{aligned}
 \text{j) } 4(2x-6)(x+16) &= 0 \\
 2x-6 &= 0 \quad \text{or} \quad x+16=0 \\
 2x &= 6 \quad \quad \quad x &= -16 \\
 x &= 3
 \end{aligned}$$

$$\begin{aligned}
 \text{k) } 3x^2 + 2x + 4 &= 10 \\
 3x^2 + 2x - 6 &= 0
 \end{aligned}$$

$$\begin{aligned}
 a &= 3 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 b &= 2 \\
 c &= -6 \\
 &= \frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -6}}{2 \times 3} \\
 &= \frac{-2 \pm \sqrt{4 + 72}}{6} \\
 &= \frac{-2 \pm \sqrt{76}}{6} \\
 &= \frac{-2 \pm 2\sqrt{19}}{6} \\
 &= \frac{-1 \pm \sqrt{19}}{3} \quad \div \text{ everything by 3} \\
 &= \frac{-1 + \sqrt{19}}{3} \quad \text{or} \quad \frac{-1 - \sqrt{19}}{3}
 \end{aligned}$$

$$\begin{aligned}
 2. \text{ a) } y &= 3x - 8 \\
 \therefore y' &= 3
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } y &= -7x^2 - 14 \\
 \therefore y' &= -14x
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } y &= (x+2)(x+1) \\
 u &= x+2 \quad v = x+1 \\
 u' &= 1 \quad v' = 1
 \end{aligned}$$

$$\begin{aligned}
 y' &= (x+2) \times 1 + 1 \times (x+1) \\
 &= x+2 + x+1 \\
 &= 2x+3
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } y &= \frac{3}{x^2} \\
 &= 3x^{-2} \\
 \therefore y' &= -6x^{-3}
 \end{aligned}$$

$$\begin{aligned}
 \text{e) } y &= e^x + 3x^2 \\
 y' &= e^x + 6x
 \end{aligned}$$

$$\begin{aligned}
 \text{f) } y &= x^2 \ln x \\
 u &= x^2 \quad v = \ln x \\
 u' &= 2x \quad v' = \frac{1}{x} \\
 \therefore y' &= x^2 \times \frac{1}{x} + 2x \times \ln x \\
 &= \frac{x^2}{1} \times \frac{1}{x} + 2x \ln x \\
 &= \frac{x^2}{x} + 2x \ln x \\
 &= x + 2x \ln x
 \end{aligned}$$

$$\text{3 a) } \log_{10} 100 = 2 \quad \text{as } 10^2 = 100$$

$$\text{b) } \log_4 16 = 2 \quad \text{as } 4^2 = 16$$

$$\text{c) } \log_9 3 = \frac{1}{2} \quad \text{as } 9^{\frac{1}{2}} = 3$$

$$\text{d) } \ln e^5 = 5 \quad \text{as } \log_e e^5 = 5$$