

Q1

$$f(x_{i+1}) \approx f(x_i) + \frac{f'(x_i)}{1!} \cdot h + \frac{f''(x_i)}{2!} \cdot h^2 \quad \left\{ \begin{array}{l} x_i \Rightarrow 1 \\ h \Rightarrow 1 \end{array} \right.$$

$$f(x) = 2x^5 - 8x^3 + 3x^2 + 4x + 6 \Rightarrow f(1) = 7$$

$$f'(x) = 10x^4 - 24x^2 + 6x + 4 \Rightarrow f'(1) = -4$$

$$f''(x) = 40x^3 - 48x + 6 \Rightarrow f''(1) = -2$$

$$f(x_{i+1}) \approx f(1) + \frac{f'(1) \cdot 1}{1!} + \frac{f''(1) \cdot 1}{2!}$$

$$\approx 7 - 4 - 1 = 2$$

$$\boxed{\text{Answer} \Rightarrow f(2) \approx 2}$$

Q2

$$\left. \begin{array}{l} a=1 \\ b=4 \end{array} \right\} \begin{array}{l} \text{initial} \\ \text{solution} \end{array} \Rightarrow \frac{1}{2}(a+b) = 2.5 \quad \left\{ \begin{array}{l} f(x) = x^2 - 2x - 6 \\ f'(x) = 2x - 2 \end{array} \right.$$

$$x_1 = 2.5$$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} \Rightarrow x_2 = 2.5 - \frac{(-4.75)}{3} \Rightarrow x_2 = 4.08333$$

$$x_3 = x_2 - \frac{f(x_2)}{f'(x_2)} \Rightarrow x_3 = 4.08333 - \frac{2.50634}{6.16666} \Rightarrow x_3 = 3.67679$$

$$\boxed{\text{Answer} \Rightarrow 3.67}$$

Q3

$$f(x) = x^2 - x - 6$$

$$\left. \begin{array}{l} f(-4) = 14 \\ f(-3) = 6 \\ f(-2) = 0 \\ f(-1) = -4 \end{array} \right\} \left\{ \begin{array}{l} x_{\text{lower}} = -3 \\ x_{\text{upper}} = -1 \end{array} \right\} \quad \left\{ \begin{array}{l} x_r = \frac{-3-1}{2} = -2 \\ x_r = -2 \end{array} \right.$$

$$f(x_r) \Rightarrow f(-2) = 0 \quad f(x_{\text{lower}}) \cdot f(x_r) = 0 \quad \text{then root is } \underline{-2}$$

$$\boxed{\text{Answer} \Rightarrow -2}$$