

Solution for Tutorial Set 4

1. Guesses are $x = -1, 4$ from a rough sketch of $f(x)$.

$$x = 4 \Rightarrow \left\{ \begin{array}{l} f(4) = -2 \\ f'(4) = 5 \end{array} \right\} \Rightarrow \delta = 0.6$$

$$x \rightarrow x + \delta = 4.6 \Rightarrow \left\{ \begin{array}{l} f(4.6) = 0.36 \\ f'(4.6) = 6.2 \end{array} \right\} \Rightarrow \delta = -0.05806$$

$$x \rightarrow x + \delta = 4.54194 \Rightarrow \left\{ \begin{array}{l} f(4.54194) = 0.003989 \\ f'(4.54194) = 6.08388 \end{array} \right\} \Rightarrow \delta = 0.00055$$

$$x \rightarrow x + \delta = 4.54138 \Rightarrow \left\{ f(4.54138) = 1 \times 10^{-7} \right\}$$

Second root at $x = -1$?

$$x = -1 \Rightarrow \left\{ \begin{array}{l} f(-1) = -3 \\ f'(-1) = -9 \end{array} \right\} \Rightarrow \delta = -0.333333$$

$$x \rightarrow x + \delta = -1.33333 \Rightarrow \left\{ \begin{array}{l} f(-1.33333) = -1.222222 \\ f'(-1.33333) = -5.6666666 \end{array} \right\} \Rightarrow \delta = -0.215686$$

$$x \rightarrow x + \delta = -1.5490196 \Rightarrow \left\{ \begin{array}{l} f(-1.5490196) = 0.046520 \\ f'(-1.5490196) = -6.098039 \end{array} \right\} \Rightarrow \delta = 0.0076286$$

$$x \rightarrow x + \delta = -1.54139 \Rightarrow \left\{ f(-1.54139) = 1 \times 10^{-5} \right\}$$

Two roots at -1.54139 and 4.54138.