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2) Find the real positive root of $3x - \cos x - 1 = 0$ by Newton's method correct to 4 decimal places.

Solu: Let $f(x) = 3x - \cos x - 1 \Rightarrow f'(x) = 3 + \sin x$

$$f(0) = 0 - 1 - 1 = -2 = -ve$$

$$f(0.5) = -1.727582562 = -ve$$

$$f(1) = 1.259197694 = +ve$$

Take $d_0 = 1$

$$\begin{aligned} \therefore d_1 &= d_0 - \frac{f(d_0)}{f'(d_0)} \\ &= 1 - \frac{(3 \cdot 1 - \cos 1 - 1)}{3 + \sin 1} \end{aligned}$$



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$$\begin{aligned}d_{i+1} &= d_i - \frac{f(d_i)}{f'(d_i)} \\ &= d_i - \frac{(3d_i - \cos d_i - 1)}{3 + \sin d_i} \\ &= \frac{3d_i + d_i \sin d_i + \cos d_i - 1 - 3d_i}{3 + \sin d_i} \\ \therefore d_{i+1} &= \frac{d_i \sin d_i + \cos d_i - 1}{3 + \sin d_i} \\ \therefore d_1 &= \frac{d_0 \sin d_0 + \cos d_0 - 1}{3 + \sin d_0} \\ d_1 &= \frac{2.381773291}{3.841470985} = 0.620015952 \\ \text{Vg } d_2 &= 0.60712066 \\ d_3 &= 0.607101648 \\ d_4 &= 0.607101648\end{aligned}$$

\therefore The root is obtained correct to six decimals.

Find an iterative formula to find \sqrt{N} (where N is a positive number) and hence find $\sqrt{5}$.

Find an iterative formula to find the reciprocal of a given number N and hence find the value of $\frac{1}{9}$.

Find the positive root of $x = \cos x$ using Newton's method.