

Name: _____

Quiz Score: _____/20

Student Number: _____

Answer questions in the space provided. Show your work.

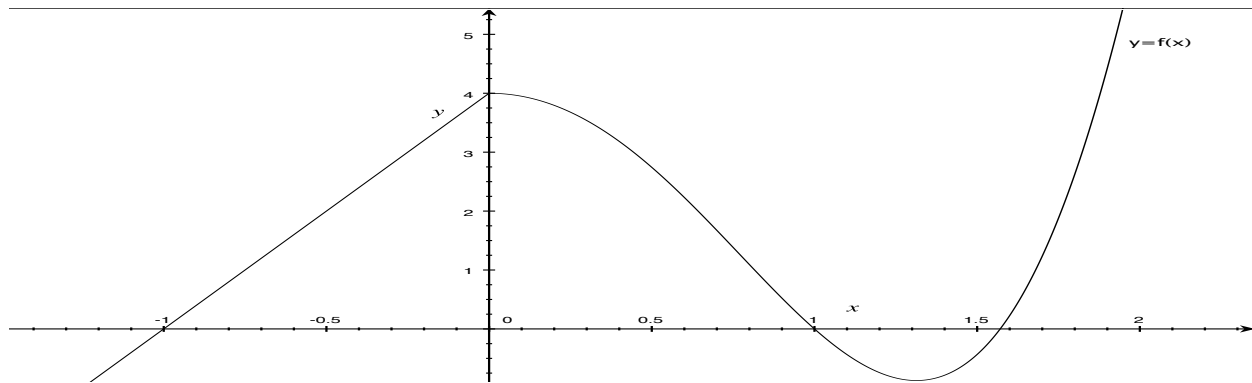
1. For functions $p(x)$, $q(x)$ and $r(x)$, function and derivative values at $x = \pi$ are given by:

$$\begin{aligned}p(\pi) &= 1, q(\pi) = 2, r(\pi) = 3, \\p'(\pi) &= 3, q'(\pi) = 2, r'(\pi) = 1.\end{aligned}$$

- (a) (2 points) For $f(x) = p(x)q(x)$, determine $f'(\pi)$.

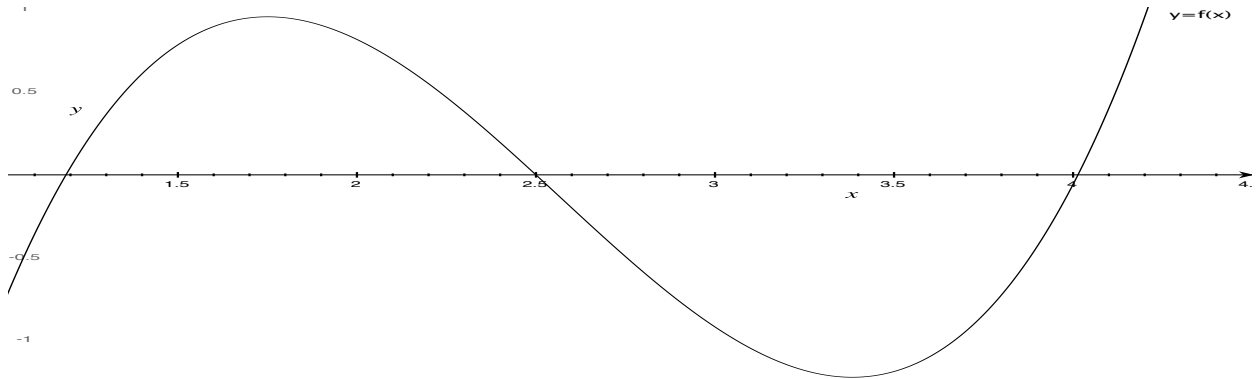
- (b) (3 points) For $g(x) = \frac{p(x)q(x)}{r(x)}$, determine $g'(\pi)$.

2. (4 points) Below the graph of the function $f(x)$, sketch $f'(x)$.

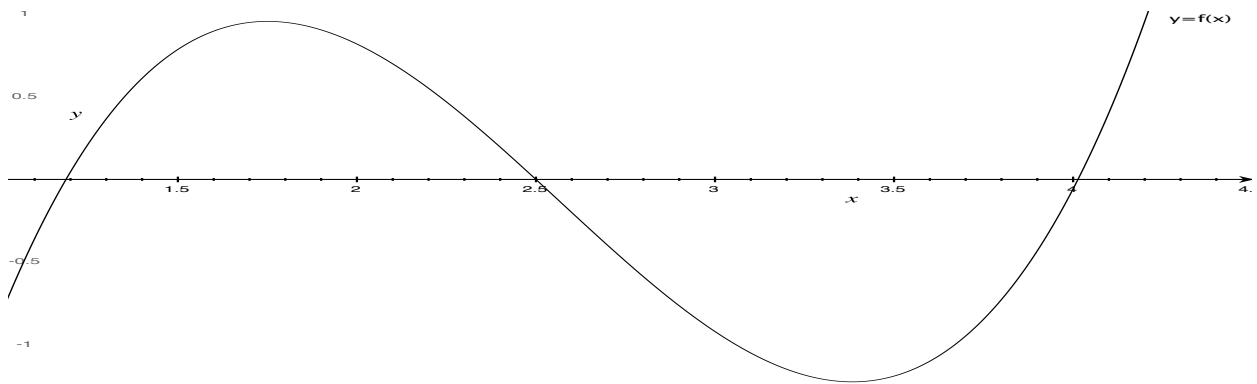


3. From (and on) the graph(s) of the function provided, sketch two iterations of Newton's method, starting with the initial estimate to a zero of the function at $x_0 = 3$.

(a) (2 points) First iteration with root approximation at x_1 :



(b) (1 point) Second iteration with root approximation at x_2 :



(c) (2 points) Estimate values of x_1 and x_2 from your sketches.

4. $f(x)$ is a function such that $f(2) = 1$ and $f'(2) = 3$.
- (a) (2 points) Determine the equation of the tangent line to $f(x)$ at $x = 2$.
- (b) (2 points) Using linear approximation, approximate $f(2.5)$.
- (c) (2 points) If $x = 2$ is an estimate to a zero of $f(x)$, use one iteration of Newton's method to find a new estimate to a zero of $f(x)$.