

True / False

If  $f(a) < 0$  and  $f(b) > 0$  (with  $a < b$ ) then there is at least one  $x$  in  $(a, b)$  with  $f(x) = 0$ .

3(a) Let  $y = \frac{1}{x^2}$ . The average rate of change of  $y$  with respect to  $x$  on  $[3, 4]$  is \_\_\_\_\_

(b) The instantaneous rate of change of  $y$  at  $x = 3$  is \_\_\_\_\_

3 If  $g(x) = \frac{1}{x-2}$ ,  $x \neq 2$  and  $(f \circ g)(x) = x$  then

$$f(x) = \underline{\hspace{2cm}}$$

4  $\lim_{h \rightarrow 0} \frac{\sin\left(\frac{\pi}{4} + h\right) - \sin\left(\frac{\pi}{4}\right)}{h} = \underline{\hspace{2cm}}$

5  $\lim_{x \rightarrow 0} \left( \frac{x \sin x}{\cos x - 1} \right) = \underline{\hspace{2cm}}$

6 The equation of the tangent line to the curve  $y = \sin x$  at  $x = \frac{\pi}{4}$  is \_\_\_\_\_

7  $\frac{d}{dx} \left( \frac{x^2}{x^4 + 1} \right) = \underline{\hspace{2cm}}$   $\frac{d}{dx} (\sec(2x)) = \underline{\hspace{2cm}}$

8 For which value of  $x$  is the tangent line to the curve  $y = x^2 - x$  parallel to the line  $2x - y + 4 = 0$  \_\_\_\_\_