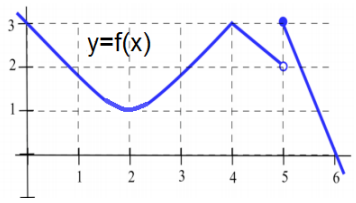
First Name: _____ Last Name: _____

Student-No: _____ Section: _____

Short answer questions

1. 2 marks In reference to the graph provided, determine if the statements below are true (T) or false (F). Each part is worth 0.5 mark.



   (a) $f(x)$ is continuous on $[1, 5]$.

   (b) At $x = 4$, the function is continuous but does not have derivative.

   (c) Graph of $f'(x)$ has only one root between $[0, 6]$

   (d) $f'(3) > 0$ and $f'(6) < 0$.

Long answer questions — you must show your work

2. 3 marks $f(x) = \left(\sqrt{x-1}\right)$. Using the limit definition for derivative, show that $f'(5) = 1/4$. No marks will be given to solutions that involve rules of differentiation.

3. Consider the piecewise function $f(x)$ defined below:

$$f(x) = \begin{cases} ax\cos(x) & x \leq 0 \\ \frac{x-1}{x+1} + be^x & x > 0 \end{cases}$$

(a) [2 marks] find b such that $f(x)$ is continuous everywhere.

Answer:

(b) [2 marks] Find a such that the function $f(x)$ is differentiable everywhere.

Answer:

(c) [1 mark] Find the equation of tangent line to the curve of $f(x)$ at $x = 0$ on the curve.

Answer: