PRACTICE EXAM

BC.Q101.EXAMINATION – FORM A

Ch 2.4, 3.1, 3.2: Derivative Foundation

NO CALCULATORS

[60 minutes]

NAME:

DATE:

BLOCK:

1[10]. Consider the function $k(x) = \begin{cases} 2x+4; \ x \le 1 \\ x^2 - 4x + 9; \ x > 1 \end{cases}$.

Formally prove that k is or is not **continuous at $x = 1$.**

2[15]. Suppose $f(x) = \begin{cases} 2x-3; \ x \ge 1 \\ x^2 - 2; \ x < 1 \end{cases}$.

Formally prove that $f(x)$ is or is not **differentiable at** $x = 1$**.**

3[5]. Consider the <u>continuous and differentiable</u> function $f(x)=\begin{cases}2x+4;\ x\ge 1\\ x^2+5;\ x<1\end{cases}$.

Find the **average rate of change** of *f* on [-2,3]. Show work.

4[20]. Let $g(x)$ be a smooth and continuous function that is not explicitly defined, but whose select values are shown in the table below. The domain for $g(x)$ is $[-4,6]$.

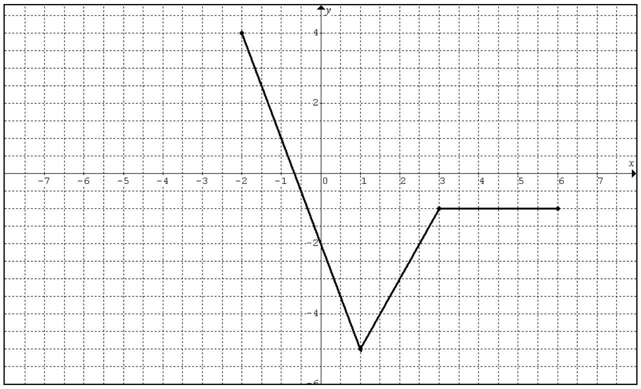
x	-4	-3	-2	0	3	4	5	6
$g(x)$	2	5	0	-2	4	6	-12	-15
$g'(x)$	?	?	?	?	1.8	?	?	?

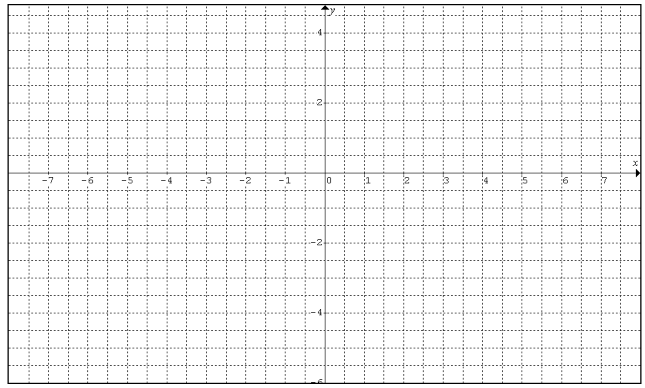
A. **Estimate** $g'(-3)$, $g'(4.5)$. Show work.

B. Write an equation of the line tangent to $g(x)$ at $x=3$.

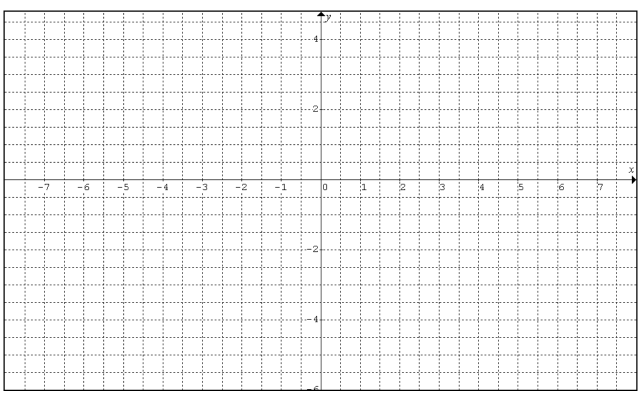
C. Find the average rate of change in g on $[-4,6]$. Show work.

5[10]. The graph of $f(x)$ is given below on the left. **Draw** the function $f'(x)$.

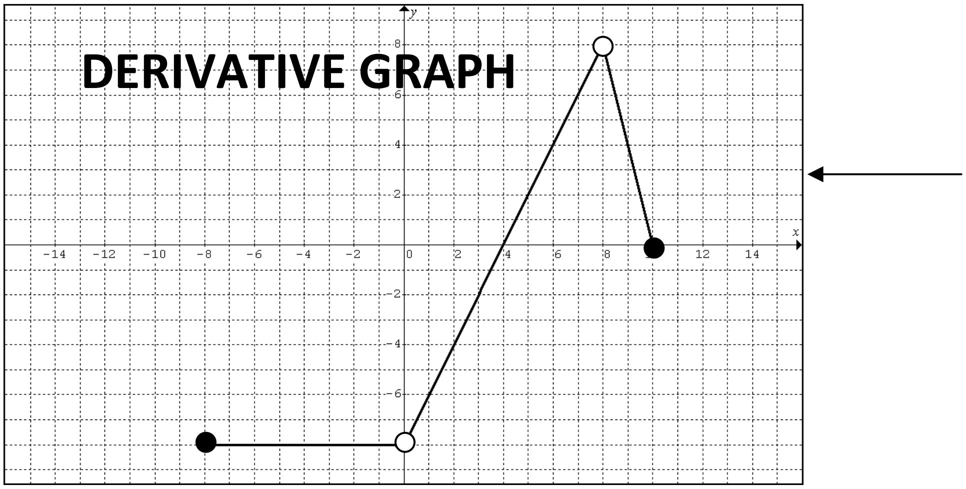




6[10]. **Draw** the function $g(x)$ which is continuous for all points on its domain. The domain of $g(x)$ is [-4, 3], $g(2) = 0$ and $g'(x) = \begin{cases} 1; & x < -1 \\ 2; & -1 < x < 1 \\ -3; & x > 1 \end{cases}$.



7[10]. The graph of the ***derivative* of** $f(x)$ is given below.



This is the graph of $f'(x)$

A. If $f(2) = 3$, write an equation of the tangent to the *f* at $x = 2$

B. For what value(s) of *x* will *f* have a horizontal tangent?

C. For what value(s) of x will *f* have a tangent line parallel to $y = -6x - 15$

8[15]. Let $f(x) = \dfrac{1}{x+1}$.

A. Use the **definition for the derivative at** $x = a$ to find $f'(2)$.

B. Write an **equation** for the line **tangent** to $f(x)$ at $x = 2$.

9[5]. Suppose that f has the property $f(x+y) = f(x)f(y)$ for all values of x and y and that $f(0) = f'(0) = 1$. Show that f is differentiable and $f'(x) = f(x)$.