MAT 1339 Section A
Calculus and Vectors
Assignment 1
September 2015

DUE DATE: NO LATER THAN 16:00 on Tuesday September 29.
The mark of 0 will be given to any assignments handed in later than that.

Instructor: Dr. Mathieu Lemire

Instructions:
- Your must submit a paper copy of your assignment.
- Make sure to write your name and student number on your assignment.
- You must show all your work whenever applicable.
- No electronic copies will be accepted. Only paper copies.
- There are 5 questions for a total of 30 points
- Do not forget to stapple your assignment

The **only** moments and places where you **can** submit your assignments are:

- Before the beginning of the classes or shortly after classes are over on September 24th or September 29th
- During my office hours on Monday September 28th or Tuesday September 29th (see course syllabus for exact location and times)
- You can deposit it in the mailbox situated in the entrance of the building 585 KED (585 King-Edwards). You shall see a mailbox with my name and the course number for our class (MAT1339)

MAT1339 Calculus and Vectors Assignment 1 Fall 2015

1. a) Use intervals to describe the domain of the function $f(t) = \dfrac{\sqrt[3]{2t+4}}{2t^2-8}$.
(2 points)

b) Use intervals to describe the domain of the function $g(x) = \dfrac{7x^2+2x-4}{\sqrt{x^2+3x-28}}$.
(2 points)

2. A charity event is taking place over 8 days. The following table indicates the amount of money raised after each day.

t (in days)	Amount of money raised
0	0
1	100.50
2	231.45
3	275.65
4	398.74
5	521.30
6	657.86
7	834.45
8	1182.32

a) Determine the average rate of change of the money raised from the beginning to the end of the 4th day and from the 6th day to the end of the event. Show your work. (3 points (1.5 points each))

b) Use the table to give an estimate of the instantaneous rate of change at $t = 3$ and $t = 6$. (2 points)

c) Do you think that more money was raised between Day 3 and Day 5 or between Day 6 and Day 8? Justify your answer. Use the average rate of change to justify your answer. (3 points)

3. a) Find the average rate of change from $x = -1$ to $x = 3$ for the function $f(x) = 1 - 4x + 3x^2$. (2 points)

b) Find a general expression for the slope of the secant at $x = -2$ for the function $f(x) = 2x^2 - 4x + 6$ (difference quotient) (so an expression involving h). Your answer must be simplified as much as possible. (3 points)

c) Use your answer in 3b to evaluate the slope of the secant between $x = -2$ and $x = -1.9$ (so $h = 0.1$) and $x = -1.99$ (so $h = 0.01$). (3 points)

4. a) Consider the function $f(x) = x^2 - 3x + 6$. Complete the following table

x	$f(x)$
2	
1.5	
1.1	
1.01	
1.001	
1.0001	

Based on this table, determine if $\lim_{x \to 1^+} f(x)$ exists and, if so, what the limit is.
(2 points)

b) Consider the function $f(x) = \begin{cases} 4x + 1, & \text{if } x < -1, \\ x^2 + 1, & \text{if } x \geq -1, \end{cases}$. Complete the following tables

x	$f(x)$
-2	
-1.5	
-1.1	
-1.01	
-1.001	
-1.0001	

x	$f(x)$
0	
-0.5	
-0.9	
-0.99	
-0.999	

Based on the tables, determine $\lim_{x \to -1^+} f(x)$, $\lim_{x \to -1^+} f(x)$ and $\lim_{x \to -1} f(x)$, if they exist. Please justify your answer for $\lim_{x \to -1} f(x)$.
(4 points)

5. a) Determine if the function $f(x) = \begin{cases} 4x - 1, & \text{if } x \leq 1, \\ 2x^2 - 3x + 4, & \text{if } x > 1, \end{cases}$
is continuous or discontinuous at $x = 1$. Justify your answer. (2 points)

b) Determine if the function $f(x) = \dfrac{5x - 2}{3x + 4}$ is continuous or discontinuous at $x = -2$. Justify your answer. (2 points)