**MCV4UR Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit 1 Test, Introduction to Calculus**

**Mark: /47 Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**** Show **all** work **neatly** in the space provided using methods taught in this course.

1. Determine which of the following limits is represented by the graph on the right.

a.  c. 

b.  d. 

1. For which value has the largest magnitude?

a. average rate of change from *x* = 1 to *x* = 1

b. instantaneous rate of change at *x* = 1

c. instantaneous rate of change at *x* = -2

d. average rate of change from *x* =  to *x* = 0

1. For the function in the diagram on the right, state the following:

a) \_\_\_\_\_\_\_\_

b) \_\_\_\_\_\_\_\_

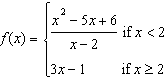
c) \_\_\_\_\_\_\_\_

d) value(s) of *x* for which *f* is discontinuous \_\_\_\_\_\_\_\_\_\_

e) Type of discontinuity at the point identified in question “***d***” above.

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1. Determine where *f*(*x*) is discontinuous and explain why the function is discontinuous.



**/3**

1. Determine each of the following limits. If the limit does not exist show why.

a) b) c)

**/3**

d) /2 e) /3 f) /2

1. Given, find using ***the definition of a derivative (first principles)***. **/4**
2. Determine **the equation** of the tangent line to the function if the tangent line is ***perpendicular*** to .

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1. Evaluate Use change of variable.

**/3**

1. If what is the value of Demonstrate use of the laws of limits. /3

1. An oil tank is being drained for cleaning. After *t* minutes, there are *V* litres of oil left in the tank, where Calculate the average rate of change in volume during the first 22 minutes.

/3

1. Suppose the motion of an avalanche is described by the function, where *s* is the distance in metres travelled by the leading edge of the snow at *t* minutes. Determine the rate at which the avalanche is moving at 4 minutes.

/3

1. Sketch the graph of any function that satisfies the following conditions:

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**/3**