**Calculator Free**

**Applications of Differentiation**

Time: 45 minutes

Total Marks: 45

Your Score: / 45



**Question One: [7 marks]**

Consider the function .

Determine the maximum value of *A*, justifying your answer with full mathematical reasoning.

**Question Two: [10 marks]**

Determine the global maximum and minimum of the function 

over the domain .

**Question Three: [10 marks]**

Sketch a graph of the function by finding all intercepts and all stationary points and their nature.

**Question Four: [5, 5 = 10 marks]**

1. Sketch a possible gradient function, , using the graph of below.



1. Sketch a possible function, , using the graph of  below.



**Question Five: [1, 1, 2, 2, 2 =8 marks]**

The graph below shows the velocity-time graph of a moving object, where time is in seconds and velocity is in m/s.

1. Determine the speed of the object when *t* = 1.
2. Determine the velocity of the object when *t* = 7.
3. Determine the speed of the object when *t* = 6.
4. Determine an expression for the rate of change of displacement with respect to time for this object in the first 2 seconds.
5. Determine an expression for the rate of change of velocity with respect to time for this object between *t* = 6 and *t* = 8.

**SOLUTIONS**

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1. Determine the velocity of the object when *t* = 7.



1. Determine the speed of the object when *t* = 6.



1. Determine an expression for the rate of change of displacement with respect to time for this object in the first 2 seconds.

 

1. Determine an expression for the rate of change of velocity with respect to time for this object between *t* = 6 and *t* = 8.

 