**Applications of Differential Calculus**

1. Provide a geometric interpretation for the formula.
2. Provide a geometric interpretation for the formula 
3. Provide a geometric interpretation for the formula 

4. Use your calculator to find the derivative using the HOME screen of the following functions at the given point.

a)  at *x = -3* b)  at  *x = 2*

c)  at *x = 2* d)  at  *x =-2*

e)  at *x =2* f)  at *x = 3*

5. Use your calculator to find the derivative of each function from problem 4 using the Graphics screen of the following functions at the given point.

6. Compute the derivative of each function from problem 4 manually. How do the answers compare to those found by the calculator? What general conclusion can be drawn about the accuracy of the value of the derivative computed numerically vs. analytically?

In some applications, data may be collected which cannot be fitted to a familiar function. In this case, the instantaneous rate of change can be approximated by the average rate of change.

7. The table below lists the number of feet that a car travels in *t* seconds to reach a velocity of 60 mi/hr in 6 seconds.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *s(t)* | 0 | 11.7 | 42.6 | 89.1 | 149.0 | 220.1 | 303.7 | 396.7 |

a) Graph the data points and connect them with a smooth curve.



b) Use the Average Rate of Change formula to approximate the velocity of the car at *t = 3* and *t = 6*.

c) Determine a regression equation that is a reasonable model for the data.

d) Use the model to find the instantaneous rate of change at *t = 3* and *t = 6*. How do the values compare using each method?

8. Let 

a) Write the equation of the line tangent to the graph of *f* at *x = 0*.

b) Use the equation found in part a) to approximate the value of 

9. The following information was obtained from a continuous function.



Sketch the graph of a function with these attributes.

10. The graph of a function *f(x)* is shown below.



Which f the following could be the graph of  Explain

For each graph you didn’t choose, give a reason why it cannot be the graph of 









