**AP Calculus 1 - 2011**

**Review for Midterm Exam - More Problems**

**The following are six past tests. You can use these problems to help you prepare for the midterm exam. The best way to prepare for this exam is to complete as many problems as possible. Solving these problems as well as the problems chosen for you in the book “Cracking the AP Calculus Exam”, and those found on the tests given during this semester, will help you be well prepared for the midterm exam.**

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

**September 3rd, 2010**

**AP Calculus 1, Mrs. Sulkes**

**Test #1 Form A, Q1**

**Functions and Graphing**

**NO CALCULATOR*. Show your work in a neat and organized manner. Justify your answers for full credit.***

(+3 each) For #1 – 6, complete the blanks to make each statement true.

1. The domain of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The range of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. The coordinates of one hole on the graph of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. The vertical asymptote(s) of  is/are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. The x-intercept of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. If (-2,4) is a point on the graph of , then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a point on the graph of .

7. (+8) State whether the function is even, odd, or neither. Prove analytically. Then, in a sentence, describe the symmetry of.



8. (+12) Write  as a piecewise function. Show the analytical steps that lead to your answer.

9. (+2 each) Match each graph with one of the functions listed below.





\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  B. 
2.  D. 

For each function in #10 – 11,

1. Sketch the graph.
2. Find any zeros and y-intercept. If none, so state.
3. State equations for any asymptotes. If none, so state.
4. Determine the coordinates of any holes. If none, so state.
5. State the domain and range.

10. (+12) 

A. Graph: You may show a preliminary graph as part of your work. Circle the final graph.

1. Zeros: Y-intercept:
2. Asymptote(s):

D. Hole(s):

E. Domain: Range:

11. (+15) 

A. Graph: You may show a preliminary graph as part of your work. Circle the final graph.

1. Zeros: Y-intercept:
2. Asymptote(s):

D. Hole(s):

E. Domain: Range:

12. (+7) Given the rational function ,

Find:

A. Zeros:

1. Asymptote(s):
2. Hole(s):

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ AP Calc Q1

Test 2

Directions: Show all work in a neat and orderly manner. Partial credit may be awarded for partial solutions. You may not use a calculator on this test. Good luck.

1. Sketch the graph of. . All graphs must include intercepts, asymptotes and key points.
2. a. Find the equation of the inverse of .

b. State the range of .

1. Evaluate the following limits. If the limit does not exist write DNE. In this case, state if the limit tends to positive or negative infinity, if possible. NOTATION!

a. 

b. 

c. 

d. 

1. Suppose that is a continuous function and the following table gives the values of for the given values of .

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | -4 | -1 | 2 | 5 |
|  | 2 | -2 | 5 | -1 |

Suppose is a real number such that . According to the Intermediate Value Theorem, between what two numbers must  fall?

Will there be more than one value of that satisfies the theorem? Use a graph to explain your answer.

1. Use the graph below to answer the following questions. If the limit does not exist, write DNE and explain.



1. find 
2. find 
3. find 
4. Is  continuous at  Use the definition to continuity to explain.
5. Is  continuous at  Use the definition to continuity to explain.
6. Sketch the function  such that the following conditions are met.





 DNE (





1. Find the values of  and that would make  **continuous** for all values of , given that .



1. State the domain of .

# **3A 3A 3A 3A 3A**

# **AP Calculus 1 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Test 3A, Quarter 1**

**Duty**

**Directions**: No calculator is permitted on this test. Show all your work in a neat and orderly manner. Partial credit may be awarded for partial solutions.

1. **Evaluate the following limits. If the limit does not exist write “DNE” and explain.**

a. 

b. 

c. 

1. If  and  then 

e. 

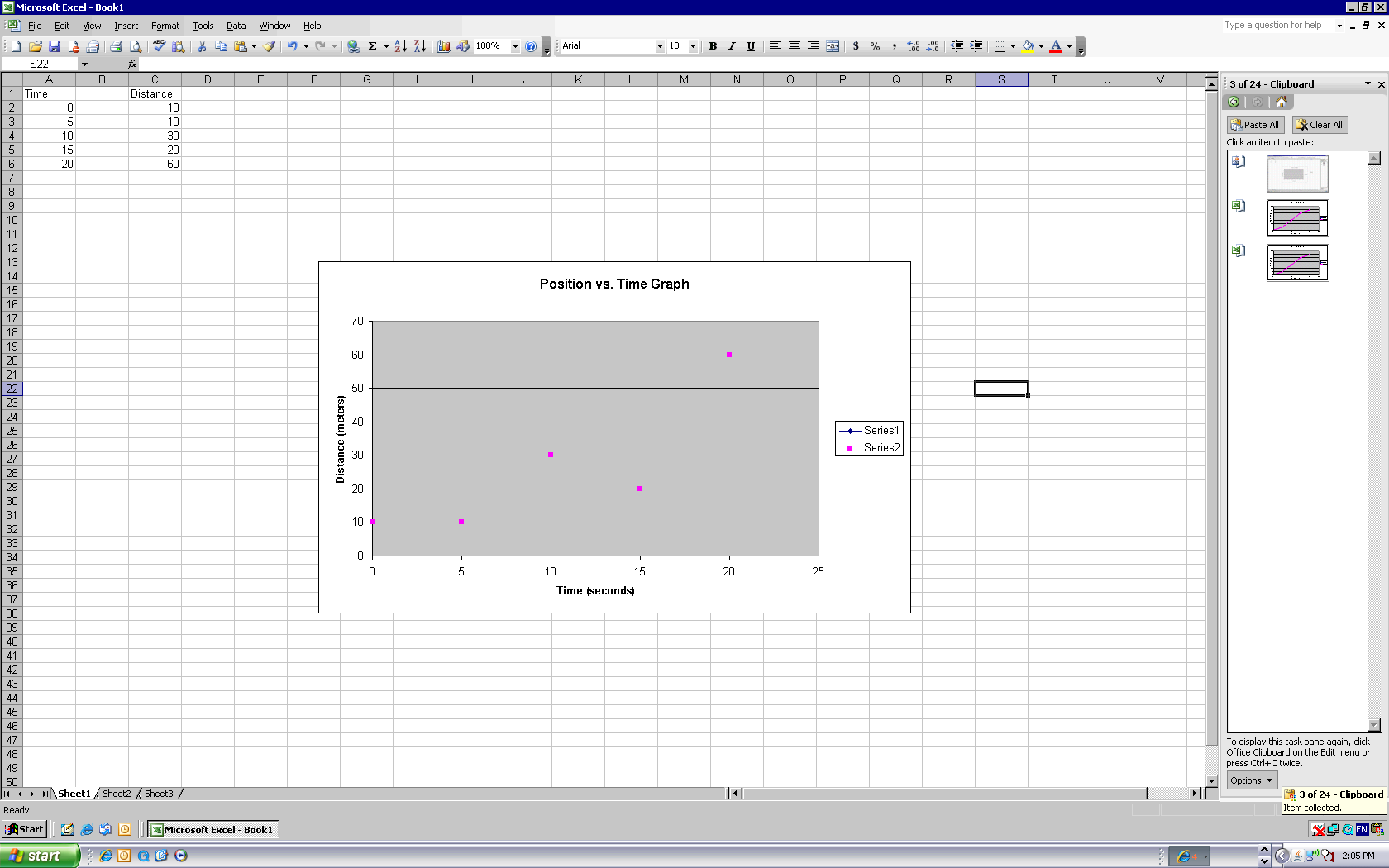
1. Find the value(s) of x, if any, at which the function f is not continuous. State the type of discontinuity.



1. Find a nonzero value for the constant k that makes 

continuous at x = 0.

1. Given . Is *f(x)* continuous at x = 2? Justify your answer.
2. The graph below shows the position versus time curve of a particle. Use the information in the graph to answer the following questions.



* 1. What is the average velocity of the particle during the first twenty seconds? Be sure to include units.
  2. On what time interval is the particle moving the fastest? Justify your answer. Be sure to include units.
  3. What is the velocity of the particle at 12 seconds? Be sure to include units.
  4. Sketch the graph of the velocity versus time graph for the particle.

1. Given .
   1. Using the limit definition of the derivative, find the derivative of *f(x)*.
   2. Find the slope of the tangent at x = 5.

# **1A 1A 1A 1A 1A**

# **AP Calculus 1 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Test 1 A, Quarter 2**

**Duty**

74 points

**Directions**: No calculator is permitted on this test. Show all your work in a neat and orderly manner. Circle the correct choice. Partial credit may be awarded for partial solutions.

1. If  then 

a. 

b. 

c. 

d. 

e. 

1. The graph of  is sketched below on the interval [0,4].

Which of the following statements about *g(x)* are (is) true?

1. There is some point *c* in the interval [0,4] such that 
2. *g* is continuous at x = 2.
3. 
4. I only
5. II only
6. I and II only
7. II and III only
8. I, II, and III

3. . Which of the following statements are (is) true?

I.  is continuous at 

II.  is differentiable at 

III. 

1. I only
2. I and II only
3. III only
4. I and III only
5. I, II, and III

4. Find 

a. 

b. 

c. 

d. 

e. 

1. If  then 

a. 

b. 

c. 

d. 

e. 

1. The equation of the line tangent to the curve  at x = -2 is y = x + 4. What is the value of k?
2. -1
3. -3
4. 1
5. 3
6. 4

7. If , then 

a. -1

b. 0

c. 

d. 

e. 

8. If  then 

1. 0

b. 

c. 

d. 

e. None of the above. Write your solution in the blank.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. If  find 
2. -5
3. 0
4. 
5. 1
6. 5

10.  

a. 

b. 

c. 

d. 

e. 

Free Response Section:

1. Find the tangent lines to the curve y = x3 – 9x that pass through the point (1,-9). Note:

(1, -9) is not on the curve. (12 points)

2. Given , find a and b so that f(x) is continuous

and differentiable. (6 points)

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

**November 3rd, 2010**

**AP Calculus 1, Mrs. Sulkes**

**Test #2, Q2 Form A**

**Derivates**

**NO CALCULATOR. *You must show the analytical work to justify each answer. Good luck!***

For #1 – 4, fill in the blanks to make each statement true:

1. The derivative of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. The function  is not differentiable at 

3. The function  is continuous on the interval \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. The derivative of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Show that the derivative of  is . Show all algebraic steps for full credit.

6. Show that the derivative of  is . Show all algebraic steps for full credit.

7. Find the derivative of .

8. If , then 

9. Find the value(s) of , if any, at which the tangent line(s) to the graph of the function  is/are parallel to the line . Justify your answer with work.

10. The  at  is:

11. What is the average rate of change on the interval (1,4) of the function ?

12. Find the values of  and so that is differentiable (and continuous) for all values of .



13. If  and  are differential functions, , and ,

then 

14. Given the graph of below, sketch the graph ofon the same coordinate plane.

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

**November 17th, 2010**

**AP Calculus 1, Mrs. Sulkes**

**Test #3, Q2 Form**

**NO CALCULATOR*. For full credit, you must* s*how the analytical work that leads to your answer.***

1. If , then 

2. If , then 

3. If , then 

4. If , then 

5. Use logarithmic differentiation to find of  in terms of . You do not need to simplify the derivative, just solve for .

6. Let  for . For what value of  is  equal to the average rate of change of on the closed interval [1,5]?

7. Use the given information to answer the questions below:

Let  and  be differentiable functions such that , , ,

, , , and .

1. If , then 

b. If , then 

8. If  is the inverse of  and , find .

9. For what value(s) of  does the graph of the function  have a vertical tangent?

10. Let  be the velocity of the particle moving along the x-axis for time *t,*  in seconds.

1. In which direction does the particle begin moving and when does it turn around? Show the analytical work to support your answer.
2. When is the particle speeding up between 0 and 5 seconds? Show the analytical work to support your answer.

11. A particle moves along the *x-*axis in such a way that its position at time *t* is given by . What is the velocity of the particle at time 

12. Given  is continuous and differentiable at , find  and .



**BONUS:** Given: 

Find . Then find the zeros of  on the closed interval :