1st Semester Final Review Calculus AB Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Find the minimum value of the function: f(x) = 
2. Find the limit of the function: f(x) =  as x approaches .
3. A rancher has 450 yards of fencing and wants to fence off a rectangular field that borders on a straight river. He needs no fencing along the river. What is the maximum area she will be able to enclose?
4. If f(x) = -x +5 and g(x) = 4x, find the value of  when x = -2.
5. Describe, in terms of shifts, how one could obtain the graph of y = .
6. Let f(x) = . Find the y – intercept of the tangent line at x = -5.
7. Find the domain of the function: f(x) = .
8. For the curve f(x) = , find the slope of the secant line through the points (4, f(4)), and (25, f(25)).
9. Find the value (s) of x at which the function f(x) =  is discontinuous.
10. Find the equation of the line tangent to the curve f(x) =  at the point

(3, 57).

11. Evaluate: .

12. If an object is thrown upward with an initial velocity of 85 ft/s, its height, in feet, after t seconds is given by h(t) = . Find the average velocity from the time t = 3 to the time t = 3.1 seconds.

1. Find the value of the constant k that makes the function:

 f(x) = continuous on 

1. Evaluate the .
2. If f(x) = , find the slope of the line tangent to f(x) at the point (-1, 36).
3. If h(x) = f(g(x)), g(3) = 6, g’(3) = -8, f’(3) = 2 and f’(6) = 8. compute h’(3).
4. If y = , compute y’.
5. Find the slope of the line tangent to the curve  at the point (1, 4).
6. If y = , calculate y’.
7. If y = , compute y’
8. Find the second derivative of y = x tanx.
9. In several sentences, explain what the following statement means:



 Is the above statement true for the function g(x) shown here? Why or why not.

23. Calculate the following limits:

a.  b. 

24. A model rocket is launched from on top of a picnic table by a curious 10 yr old kid. As she watches the rocket fly, she carefully calculates that for the first few seconds, the rockets height is modeled by the equation:  where time is measured in seconds and the height is measured in meters.

 a) What is the average velocity of the rocket over the first second?

1. What is the instantaneous velocity of the rocket at t = 1 second?

25. On the set of axes on the left is the graph of a function g(x). Graph g’(x) on the set of axes on the right. Be sure to use the same scale (along the y-axis) for both graphs.

26. Find y’

a.  b. 

27. Find y’’

a.  b. 

1. What is the x-coordinate of the point of inflection on the graph of 
2. *f* is continuous for  but not differentiable for some c such that . What can be said about the graph of *f* at point *c.*
3. If , then when x = 1, =
4. Let *f* and *g* be differentiable functions with the following properties:

I.  for all x II. 

If  and , then 

1. What is the instantaneous rate of change at x = 3 of the function *f* given by ?
2. If , then is
3. The graph of the function *f* shown in the figure has

a horizontal tangent at the point (-1, -3) and a cusp

at (2, 0). For what values of x,  is f not

 differentiable?

1. A particle moves along the x-axis so that its position at time t is given by . For what value of t is the velocity of the particle zero?
2. If , find 
3. The graph of a twice differentiable function *f*  is

Shown. Which of the following is true?

(A)  (B) 

(C)  (D) 

(E) 

1. What is an equation of the line tangent to the graph of  at x = 0?
2. If , then the graph of *f* has inflection points when x =?
3. The function *f* is given by . On what intervals is *f* decreasing?
4. The graph of *f* is shown in the figure at the right.

Sketch a possible graph of the first derivative.

1. What is the minimum acceleration attained on the interval  by the particle whose velocity is given by .
2. The function *f* is continuous on the closed interval [1, 3] and has the values given in the table. The equation  must have at least two solutions in the interval [1, 3] if k =

|  |  |  |  |
| --- | --- | --- | --- |
| X | 1 | 2 | 3 |
| *f(x)* | 2 | k | 4 |

1. If , then 