Name: _____

Section #: _____

Math 165: Midterm — Part 2

Fall 2014

This part of the exam has 6 problems. Each problem is worth 9 or 10 points.

Answer each question completely. Show all work. No credit is allowed for mere answers with no work shown. Show the steps of calculations. State the reasons that justify conclusions

Question 1: _____

Question 2: _____

Question 3: _____

Question 4: _____

Question 5: _____

Question 6: _____

58 **Total Points:** _____

Question 1. Use the limit definition of derivative to calculate the derivative of $g(t)$ with $g(t) = \sqrt{2t+3}$. (No credit will be awarded for calculating the derivative *without* using the limit definition.) (10 points.)

Question 2. Let $H(x) = \dfrac{u(x)v(x)}{w(x)}$ where $u(x)$, $v(x)$ and $w(x)$ are differentiable functions, with

$$u(-2) = 3, \quad v(-2) = -2, \quad u'(-2) = 4, \quad v'(-2) = 0, \quad \text{and} \quad w'(-2) = 1.$$

If $H'(-2) = -2$, find all possible values of $w(-2)$. (9 points.)

Question 3. The function F is differentiable with

$$F(-1) = 12, \quad F'(-1) = -3, \quad F(4) = \sqrt{3}, \quad \text{and} \quad F'(4) = \sqrt{5}.$$

Given that $G(x) = F(\sqrt{x+17})$, calculate the value of $G'(-1)$. (9 points.)

Question 4. An object moves along the horizontal s-axis so that at time $t \geq 0$ seconds, its position on the s-axis (which is marked in meters) is

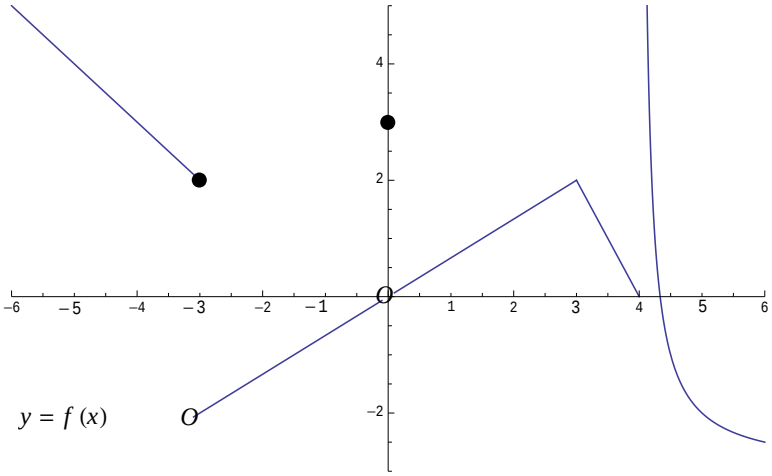
$$s(t) = e^t(t^2 - 9t + 19) \text{ meters.}$$

a. Find all t value(s) for which the velocity of the object is 0 m/sec, and give the position of the object on the s axis for each of these times. (4 points.)

b. For what times $t \geq 0$ is the object moving to the left? (3 points.)

c. For what value(s) of $t \geq 0$ is the acceleration of the object equal to 0 m/sec^2? (3 points.)

Question 5. The graph of a function f, defined on the interval $(-6, 6)$, is shown below. (2 points each.)



a. For what value(s) of x, $-6 < x < 6$, does f fail to be continuous?

b. For what value(s) of x, $-6 < x < 6$, does f fail to have a derivative?

c. What is the value of $f'(2)$?

d. For what value(s) of x, $-6 < x < 6$, does f have a removable discontinuity?

e. For what value(s) of x, $-6 < x < 6$, does $g(x) = |f(x)|$ fail to be continuous?

Question 6. Write a formula for a function f so that the graph of $y = f(x)$ has horizontal asymptote $y = 2$, vertical asymptotes at $x = -1$ and $x = 3$, and no other asymptotes. You must show that your function has the required asymptotes. (10 Points.)