

MATH 211-1

EXAM #2

NAME: _____

CIRCLE YOUR DISCUSSION SECTION:301
Gupta
7:45am302
Gupta
8:50am303
Meyer
8:50am304
Virk
9:55am305
Mueller
12:05pm306
Virk
2:25pm307
Mueller
1:20pm308
Rui
2:25pm309
Meyer
2:25pm310
Rui
3:30pm311
Konate
3:30pm

| Problem | Points Possible | Points Earned |
|--------------|-----------------|---------------|
| 1 | 20 | |
| 2 | 20 | |
| 3 | 20 | |
| 4 | 20 | |
| 5 | 20 | |
| Total | 100 | |

1. (20 points) Consider the function

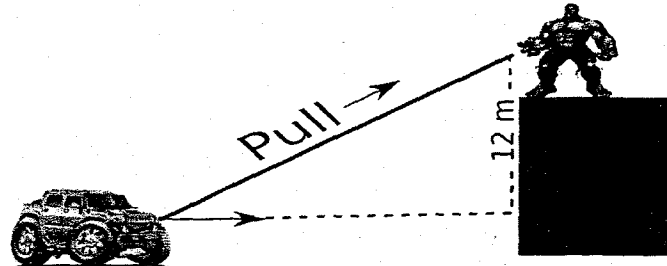
$$y = \frac{x^4}{(x-1)^2}.$$

- (a) (4 points) Compute the first derivative.
- (b) (4 points) Find all the critical points, determine where the function is increasing and decreasing, and use the first derivative test to determine if the critical points are local maxima, local minima, or neither.
- (c) (4 points) Compute the second derivative.
- (d) (4 points) Determine where the function is concave up and concave down and determine all of the inflection points.
- (e) (4 points) What are the global maximum and minimum for this function?

2. (20 points)

- (a) (2 points) State the product rule.
- (b) (18 points) Use the definition of the derivative to come up with the product rule.

3. (20 points) The Incredible Hulk is standing on top of a building 12 meters tall and pulling on a rope that is attached to a car. As he pulls on the rope, the car is being pulled toward the building. Suppose that the Hulk is able to pull the rope at a rate of 10 meters per minute. How fast is the car moving toward the building when it is 5 meters away?

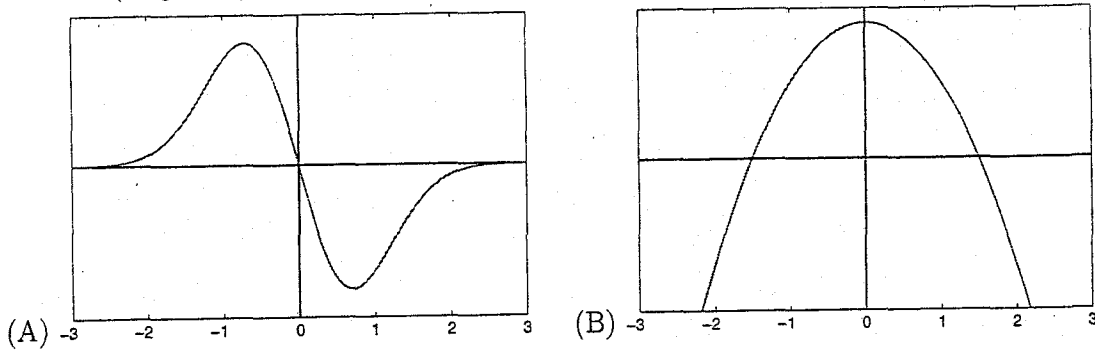


4. (20 points) Consider a curve defined by the following equation:

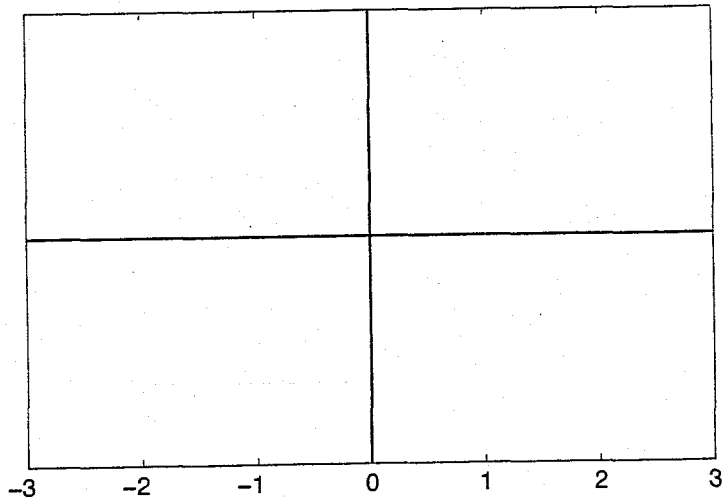
$$(x+1)^2 + y^2 + \ln(x+1) = (1 - \ln y) e^{x^2} + y$$

- (a) (15 points) Find the slope of the tangent line to this curve as a function of x and y .
- (b) (5 points) Find the equation of the tangent line at the point $(0, 1)$.

5. (20 points) Consider the following two plots:



(a) (10 points) Plot (A) is the plot of $f(x)$. In space provided below, sketch $f'(x)$:



(b) (10 points) Plot (B) is the plot of $g'(x)$. In space provided below, sketch $g(x)$:

