

## Midterm #2, Math 16a, Fall 2010

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Thursday, November 4, 2010

Your Name:

Your TA's Name:

Your Section Number:

**Scoring.** There are six problems. Problems 1-4 are worth 10 points each and problems 5 and 6 are worth 15 points each, for a maximum possible score of 70 points.

**IMPORTANT:** Do all work on the exam, use the back if you need more space. **No calculators, notes, or books.**

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**Score**

1.

2.

3.

4.

5.

6.

**Total**

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1. Differentiate  $f(x) = e^{\frac{x-1}{x^2+1}}$ .

- Find the equation of the tangent lines to the graph of  $x^2y^4 = 1$  at the point  $(4, \frac{1}{2})$  and at the point  $(4, -\frac{1}{2})$ .

- Farmer Brown has 40 feet of fencing and wishes to make a rectangular fenced-in area for his flock of chickens. If he uses his house for one side of the fence, what is the maximum area he can enclose?

4. The length  $\ell$  of a rectangle is decreasing at a rate of 1 cm/sec and the width  $w$  of the rectangle is increasing at a rate of 2 cm/sec. Find the rates of change for the area and for the length of the diagonal when  $\ell = 5$  and  $w = 12$ . Indicate whether these quantities are decreasing or increasing.

5. (15 points) Let  $f(x) = e^{-x^2}$ . Find all x-intercepts, asymptotes, relative extreme points, and points of inflection for  $y = f(x)$ . State how you know that the points you find are correctly identified.

6. (15 points) Sketch the graph of  $y = x^4 - 4x^3$ . Clearly indicate all  $x$ -intercepts, relative and absolute extreme points, and points of inflection.