

MATH 2250

Practice Final

May 4, 2011

NAME (please print legibly): _____

Your University ID Number: _____

Please complete all questions in the space provided. You may use the backs of the pages for extra space, or ask me for more paper if needed. Work carefully, and try to complete the problems you find easier before going back to the harder ones.

YOU ARE BEING GRADED ON EXPOSITION AND CLARITY AS WELL AS CORRECTNESS. A CORRECT ANSWER WITH INADEQUATE, MESSY, OR UNREADABLE SUPPORTING WORK WILL NOT RECEIVE FULL CREDIT. PLEASE EXPLAIN YOUR WORK!

Good luck!

QUESTION	VALUE	SCORE
1	15	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
11	10	
12	10	
13	10	
TOTAL	135	

1. (15 points) Find the values of x at which $f'(x) = 0$ for the following functions:

$$f(x) = x^3(3 - 5x)^2$$

ANSWER: _____

$$f(x) = x\sqrt{x-1}$$

ANSWER: _____

$$f(x) = \frac{x^3}{x^2 - 1}$$

ANSWER: _____

2. (10 points) Suppose we know $x'(t) = -5$ and $y'(t) = -7$, $x(t) = 4$ and $y(t) = 3$ at time t . What is the rate of change of

$$f(t) = \sqrt{x(t)^2 + y(t)^2}$$

at this time?

ANSWER: _____

3. (10 points) A fireworks charge is shot into the air at 100 mph. How high does it go? (Helpful hints: The acceleration of gravity is $-32\text{ft}/\text{sec}^2$ and there are 5280 feet in a mile.)

ANSWER: _____

The charge has a 7 second fuse, which is ignited when the charge leaves the ground. How far above the ground is it when it explodes?

ANSWER: _____

4. (10 points) Find the point on the graph of $y = 2/x$ which is closest to $(0, 0)$. (Hint: Write the distance from (x, y) to $(0, 0)$ in terms of x and differentiate.)

ANSWER: _____

5. (10 points) Suppose $(x - y)^4 = \tan(xy)$. Find dy/dx .

ANSWER: _____

6. (10 points) Use Newton's Method and your calculator to find the solution to the equation $\cos x = 2x$ to four decimal places.

ANSWER: _____

7. (10 points) Find the maximum and minimum values of the function $f(x) = (x - 1)^2 + x^3$ on the interval $[0, 1]$.

ANSWER: _____

8. (10 points) Integrate

$$\int (2x + 5)(x^2 + 5x)^7 dx$$

ANSWER: _____

9. (10 points) Integrate

$$\int_0^{\sqrt{\pi}} x \sin x^2 dx.$$

ANSWER: _____

10. (10 points) Integrate

$$\int \frac{3^x + 4^x}{5^x} dx.$$

ANSWER: _____

11. (10 points) Differentiate

$$f(x) = \sin x \arctan^2 x.$$

ANSWER: _____

12. (10 points) Find the integral

$$\int \frac{3+x}{x^2+4} dx$$

ANSWER: _____

13. (10 points) Solve the differential equation

$$y' = 2y$$

with the initial condition $y(1) = 5$.

ANSWER: _____