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Math 211  
Lecture 2

Spring 03/04  
G.Meyer

Final

**Your Name:** \_\_\_\_\_

**Your TA:** \_\_\_\_\_

| Problem | Points | Score |
|---------|--------|-------|
| 1       | 8      |       |
| 2       | 8      |       |
| 3       | 10     |       |
| 4       | 16     |       |
| 5       | 16     |       |
| 6       | 20     |       |
| 7       | 10     |       |
| 8       | 12     |       |
| Total   | 100    |       |

1. Find  $\frac{dy}{dx}$  in terms of  $x$  and  $y$  for  $x^2 = \ln(1 + y^2)$ .

2. If  $f(x, y) = x^3 + 2xy - 6y^2$ , then  $(0, 0)$  is a critical point. Determine, whether there is a local minimum, a local maximum, or a saddle point at  $(0, 0)$ .

3. The prices of Dotcomco stock at the end of the first three quarters are \$18, \$14, \$12.

(a) Find the least squares line that fits this data.

(b) Use your answer to part (a) to predict the stock price at the end of the fourth quarter.

4. Find the maximum value of  $f(x, y) = 6x - 8y$  subject to the constraint  $3x^2 + 4y^2 = 7$ .

5. (a) Sketch the graph of  $y = (\tan x) - 2x$  over the interval  $(-\pi/2, \pi/2)$ .
- (b) Show by your work where the graph is increasing, decreasing, concave up, concave down.
- (c) List any vertical asymptotes. Show by your work if there are any local extreme points and inflection points.

6. Find

(a)  $\int \sin 2x \cos 2x dx$

(b)  $\int_0^1 x \sin(2\pi x) dx$

(c)  $\int_0^\pi \cos^2 t dt$

7. Consider the initial value problem  $dy/dt = 3 - y$ ,  $y(0) = 1$ . Use Euler's method with 3 steps to compute  $y(3)$ .

8. For  $\frac{dy}{dt} = 0.1(10y - 16 - y^2)$  find the equilibrium solutions and determine whether they are asymptotically stable.