NAME _____   TA'S NAME _____

STUDENT ID _____   SECTION _____

Math 124E, 124F
Winter 2011

Midterm 2
February 22, 2011

Point totals are indicated in parentheses. You must show your work to receive credit.

(16) 1. Compute the derivative of the following functions. You need not simplify your answers.

    a. $y = (1 + \sqrt{1 + x^2})^{1/3}$

    b. $y = x^{(2^x)}$

    c. $y = \ln(\sin^{-1}(\sqrt{x}))$

    d. $y = \sin(x \cos(x^2))$

(6)   2. Find the slope of the line tangent to the curve

$$\cos(\pi xy) = x^2 y - \frac{1}{2}$$

at the point $(-1, \frac{1}{2})$.

(10)   3. A low flying bombing plane, 150 feet long, is flying at an altitude of 200 feet. A telescope on the ground measures the angle $\theta(t)$ subtended by the plane at time t, as in the picture below. Suppose that this angle is changing at the rate of $-.9$ radians/sec at the instant that the plane is directly above the telescope. How fast is the plane flying at that time? tail of the

plane

150

200

$\theta(t)$

ground

← telescope
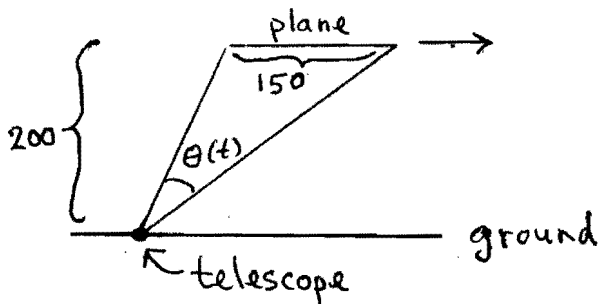
(8) 4. Let c be a positive constant, and let C be the curve defined by the parametric equations

$$\begin{aligned} x(t) &= ct^2 + t - 2 \\ y(t) &= 2t^2 + ct - 8 \end{aligned}$$

for $t > 0$. The point $(4c, 2c)$ is the point on the curve corresponding to the value $t = 2$ of the parameter.

a. Find the equation of the line tangent to C at $(4c, 2c)$.

b. For what value of c does this tangent line pass through $(0, 0)$?