

## Math 185 – Quiz #4

December 3, 2007

Name: \_\_\_\_\_

Instructors: Patricia Wrean & Bogdan Verjinschi

Total: 30 points

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1. Find the derivative  $\frac{dy}{dx}$  for the following functions.

a)  $y = \frac{\sec x}{x}$  (3 points)

b)  $y = \ln(x \tan^{-1} x)$  (4 points)

c)  $e^y = y \sin 2x$

(5 points)

2. Find the derivative  $f'(x)$  for the following function. It should simplify nicely.(5 points)

$$f(x) = 2x \sin x + 2 \cos x - x^2 \cos x$$

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3. Rewrite  $y = \cot x$  in terms of other trig functions and then differentiate in order to **derive** the rule for differentiating the cotangent function. (3 points)

4. If  $\ln 2 = 0.693$  (to three decimal places), estimate  $\ln 2.002$ . (Hint: use a differential to estimate the change in  $y = \ln x$  as  $x$  increases from 2 to 2.002.) (4 points)

5. A passenger on a ferris wheel has coordinates given by  $x = 10 \cos \theta$  and  $y = 10 \sin \theta$ , where the coordinates  $x$  and  $y$  are given in metres. If the ferris wheel is rotating such that the angle is changing at a constant rate of  $\frac{d\theta}{dt} = 0.2$  rads/s, find
- the **magnitude** and **direction** of the velocity of the passenger when  $\theta = \pi/2$
  - the **magnitude** of the velocity of the passenger for any angle  $\theta$ .
- (6 points)