MATH 205   EXAM 2

7:30—8:30 pm, Thursday   October 12, 2006

Instructor's Name:____________________   **Name:**____________________________

No books or formula sheets are allowed. Use the back page as a sketch paper. For full credit, show your work in detail.

Total: 100	#1	#2	#3	#4	#5	#6	#7	#8

1 (13 pts). The table shows $f(t)$, total world gold production in mn troy ounces,as a function of year t.

Year t	1990	1993	1996	1999	2002
$f(t)$	70.2	73.3	73.6	82.6	82.9

- **(a 6pts.)** Estimate $f'(2002)$.

.

- **(b 7pts.)** Use $f'(2002)$ to estimate CD sales of $f(2003)$.

2 (12pts). Sketch a graph of derivative function of the given function. (Draw your graph on the same coordinate system for the given function.)

3 (15pts, 5 each). Find the derivatives of the given functions.

- **a.** $f(x) = 8x^3 - 4x^2 + 12x - 3$. Find $f'(x)$.
  $f'(x) =$

- **b.** $z = \ln x + \dfrac{1}{x}$.
  $z'(x) =$

- **c.** Let $y = 5^t + \dfrac{1}{\sqrt{t}}$. (No simplification is needed.)
  $\dfrac{dy}{dt} =$

4 (15 pts). Apply the chain rule to find derivatives of following functions.

(a. 5pts). $w = (t^2 + 5)^{100}$.
$w'(t) =$

(b. 5pts). $R(z) = e^{z^2 - z + 1}$.
$R'(z) =$

(c. 5pts). $f(t) = 9t^2 + \ln(7t + 2)$.
$f'(t) =$

5 (12 pts). Find derivatives of the following functions.

(a. 6pts.) Let $f(t) = 5t \cdot e^{3-2t}$. (Simplify your result.)

$f'(t) =$

(b. 6pts). $y = \dfrac{1-t}{1+t}$. (Simplify your result).

$\dfrac{dy}{dt} =$

6 (10 pts). Revenue and cost functions for a company are given below in the figure.

Should the company produce the 500^{th} item? Show your argument in detail in terms of marginal revenue and marginal cost.

7 (12 pts.) The total cost and the total revenue (in dollars) for the production and sale of q hair dryers are given by

$C(q) = 2000 + 5q$ and $R(q) = 40q - 0.05q^2$.

(a. 4pts). Find the marginal cost and marginal revenue functions.

(b. 4pts). Find the profit function $P(q)$.

(c. 4pts). Find the intervals of quantity q on which the profit $P(q)$ is increasing, decreasing, respectively.

8(11 pts). Find the equation of the tangent line to the graph of $y = e^{-2x}$ at $x = 0$. (You need not to draw a graph).