

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 112 A
Midterm I
April 24, 2007

Problem 1	10	
Problem 2	10	
Problem 3	15	
Problem 4	15	
Total:	50	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 5 pages in total and 4 problems. Make sure you have a complete test.
- Unless otherwise instructed, you **must show how you get your answers**.
Correct (or incorrect) answers with no supporting work may result in little or no credit.
- If an algebraic method is available, answers obtained by guessing, approximating, or plug-and-check will get little or no credit.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK

Do you want me to post your grade so far on the class website under the last 4 digits of your STUDENT ID (in about a week)?

Yes, please post my grade. Sign to give permission: _____

No, please don't post my grade so far.

1) (10 points)

a) Find the derivative $f'(y)$, if $f(y) = \frac{5 + y^2 + 3y^3}{y^2}$

Answer: $f'(y) =$ _____

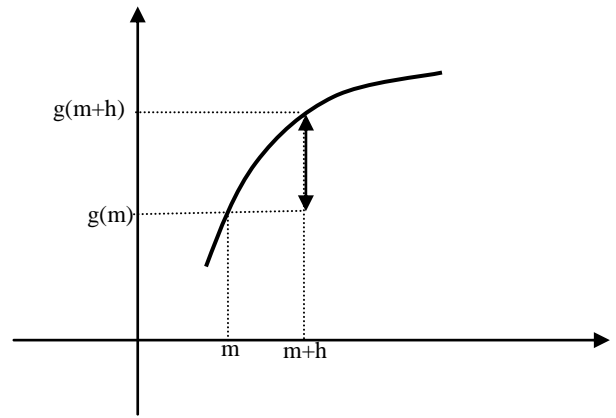
b) Find the derivative $\frac{dy}{dx}$, if $y = \sqrt{x^3} - \frac{2}{\sqrt[5]{x}} + 7.3$

Answer: $\frac{dy}{dx} =$ _____

2. (10 points)

You do not know the formula for the function $g(x)$, but you are told that the rise in the graph of $g(x)$ from $x=m$ to $x=m+h$ is given by the following formula:

$$g(m+h) - g(m) = \frac{mh}{(m+1)(m+h-1)}$$



a) Find the slope of the secant line through the graph of $g(x)$ at $x=3$ and $x=5$.

Answer: _____

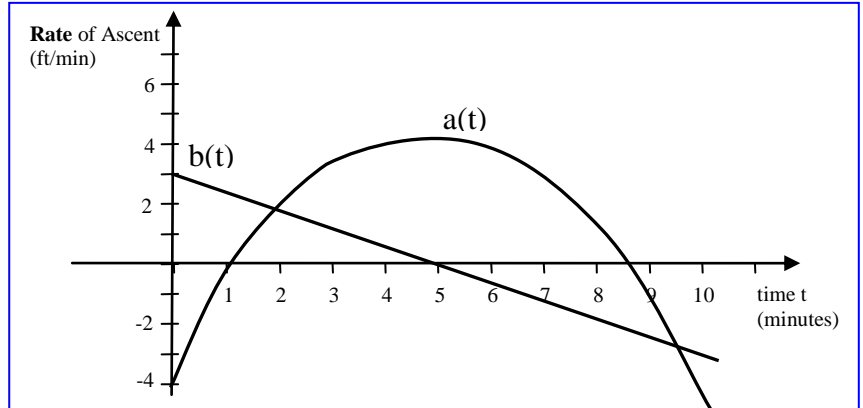
b) Find the slope of the tangent line at $x=3$.

Answer: _____

3. (15 Points) Two weather balloons, A and B, start off at the same altitude of 100 feet at $t=0$ and move straight up or down for 10 minutes.

The two graphs at right, labeled $a(t)$ and $b(t)$, represent the respective **rates of ascent** (in feet/minute) for the two balloons. That is, these are the **derived graphs** for the altitudes of the two balloons.

Use these graphs to answer the following questions. No need to show work or explain your answers.



a) How fast is balloon A moving at time $t=0$, and in what direction?

Answer: At $t=0$, balloon A is moving up / down at _____ ft/min.

b) Circle the correct answer: At $t=5$ minutes, balloon **B's altitude** is :

- i. Zero feet (that is, balloon B is at ground level)
- ii. At its highest above ground
- iii. At its lowest above ground
- iv. None of the above

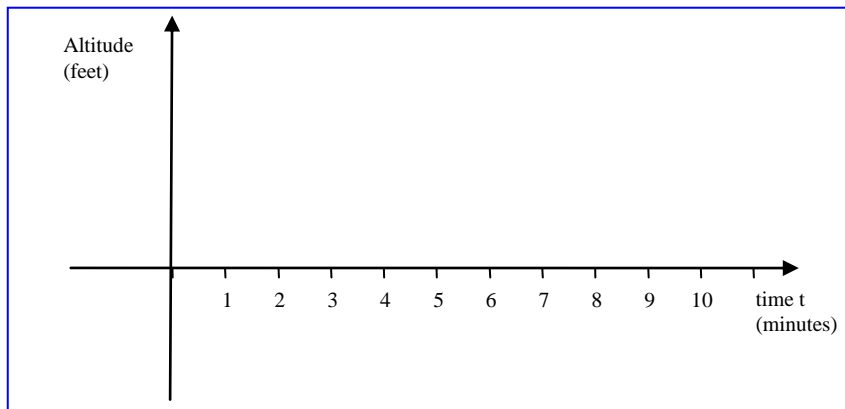
c) Find the longest time interval over which both balloons are rising.

From $t =$ _____ to $t =$ _____ minutes.

d) In the first 5 minutes, at what time will the vertical distance between the two balloons be greatest? Which balloon is higher above ground at that time, A or B?

At $t =$ _____ minutes. Balloon _____ is higher at that time.

e) Sketch the graph of the **altitude** above ground for **balloon A**. Label the y-intercept.



4. (15 Points) Your company, "Stick It", produces and sells Bumper Stickers. The Total Revenue and Total Cost, in **hundreds of dollars**, for producing q **hundred Stickers** are given by the following formulas:

$$TR: R(q) = -0.3q^2 + 4q$$

$$TC: C(q) = \frac{1}{15}q^3 - \frac{1}{10}q^2 + q + 1$$

- a) Find formulas for the Marginal Revenue and the Marginal Cost for producing q hundred Stickers.

Answer: $MR(q) =$ _____

$MC(q) =$ _____

Units for both MR and MC : _____

- b) Find the quantity at which the Marginal Cost is lowest.

Answer: MC is lowest at _____ Stickers.

- c) What is your maximum profit? (include correct units).

Answer: The maximum profit is _____.