

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 111 A
Midterm I
October 19th, 2006

Problem 1	6	
Problem 2	12	
Problem 3	12	
Problem 4	20	
Total:	50	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 4 pages in total and 4 problems. Please check that your test is complete!
- You **must explain how you get your answers**. Correct (or incorrect) answers with no supporting work may result in little or no credit. On problems in which you use a graph, draw lines, label them, and mark points clearly.
- Write your **final answer in the indicated spaces**. Unless otherwise noted, round your answer to two decimal digits.
- 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 next week on the class website under the last 4 digits of your student ID?

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

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

1 (6 points) Solve the following pair of linear equations:

$$\begin{cases} x - 2 = y \\ 2x + 1 = 4y \end{cases}$$

Work: Solve for x in the first equation: $x=y+2$, then substitute in the second:

$$2(y+2)+1=4y. \text{ Solve for } y:$$

$$2y=5$$

$$y=2.5$$

$$\text{Hence } x=2.5+2=4.5$$

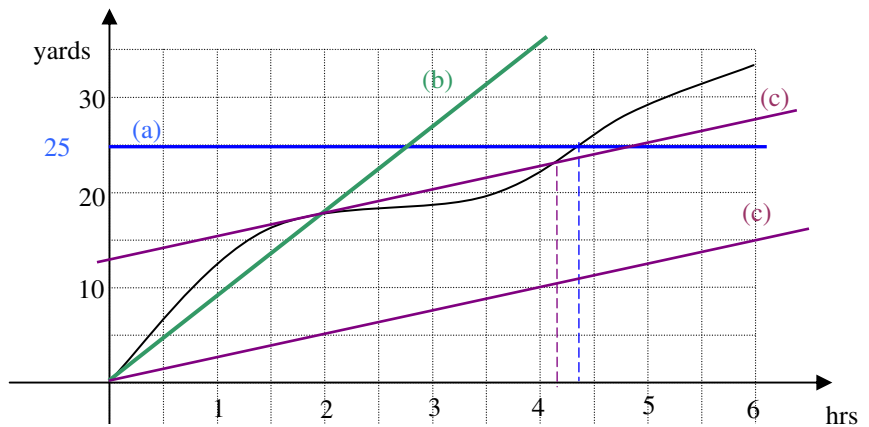
Note: there are other correct ways to get the same answers.

Answer: $x = \underline{4.5}$, $y = \underline{2.5}$

2 (12 points)

The graph to the right represents the distance $D(t)$ (in yards) traveled by the Mars Rover vehicle up to time t (in hours).

In all questions below we accepted a range of values as correct, as long as correct work was shown and the lines/measurements used were not too far off.



a) How long did the vehicle take to travel 25 yards?

Work:

Draw a horizontal line at height 25. Find the time at which it intersects the graph.

Answer: it took 4.35 hours.

b) What was the average trip speed of the Rover two hours into the trip? (include units)

Work:

Draw a diagonal line to the point on the graph corresponding to $t=2$. Measure the slope.

OR: use $ATS(2)=D(2)/2=18/2=9$

Answer: $ATS(2)=\underline{9}$ Units: yards per hr

c) Find a time t , if any, such that $\frac{D(t) - D(2)}{t - 2} = 2.5$

Work: Translation: Find t such that the AS (slope of secant) from 2 to t is 2.5.

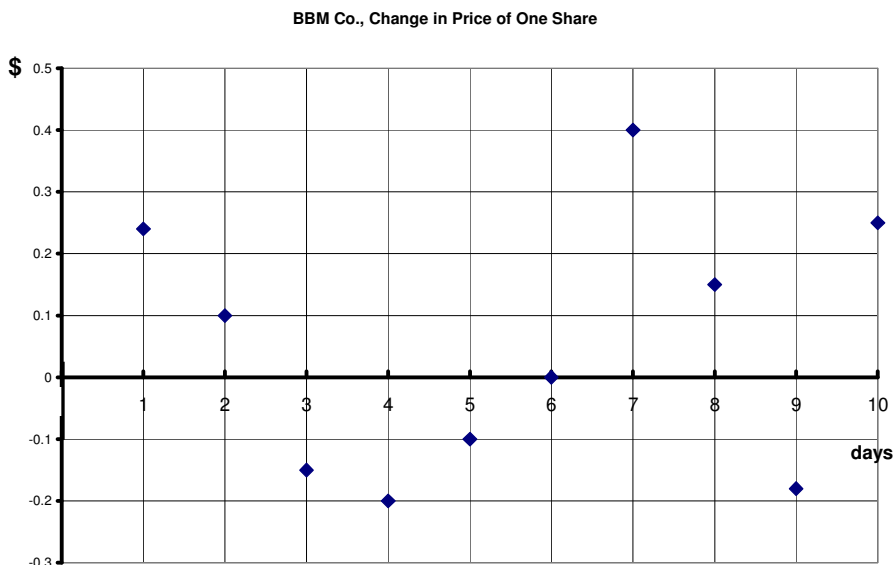
1. Draw a ref line of slope 2.5.

2. Move your ruler parallel to the reference line until it intersects at $t=2$ and another time t .

3. Find the time t of the other intersection point

Answer: $t = \underline{4.15}$ hours.

3 (12 points) The opening price of one share of stock for the BBM Company is monitored over a period of 10 days. The graph below gives **the change** in the opening price since the previous day. For example, the point (3, -0.15) on the graph means that the opening price of the stock on day 3 was \$0.15 lower than on day 2.



a) When was the opening price higher, on day 0 or on day 2? Circle one and explain.

The opening price was higher on day 2 because both changes in stock price (0->1 & 1->2) are positive, so the price is increasing from day 0 to day 2.

b) What was the average rate of change of the stock price over the first week?

Work:

Over the first week, $\Delta P = P(7) - P(0) = 0.24 + 0.1 - 0.15 - 0.2 - 0.1 + 0 + 0.4 = \0.29

Avg rate of change of stock price = (change in price)/(change in time) = $\Delta P/7 = 0.29/7 = 0.04$

Answer: 0.04 \$ per day

Note: We also accepted answers which read the first increment as 0.25.

c) Suppose the opening price of a share of BBM was \$10.50 on day 0. How much would it cost you to buy **1000 shares** at opening on day 5?

Work:

$P(0) = 10.5$

$\Delta P = P(5) - P(0) = 0.24 + 0.1 - 0.15 - 0.2 - 0.1 = -0.11$

$P(5) = 10.5 - 0.11 = 10.39$ (that is, the stock opens at 10.39 per share on the 5th day)

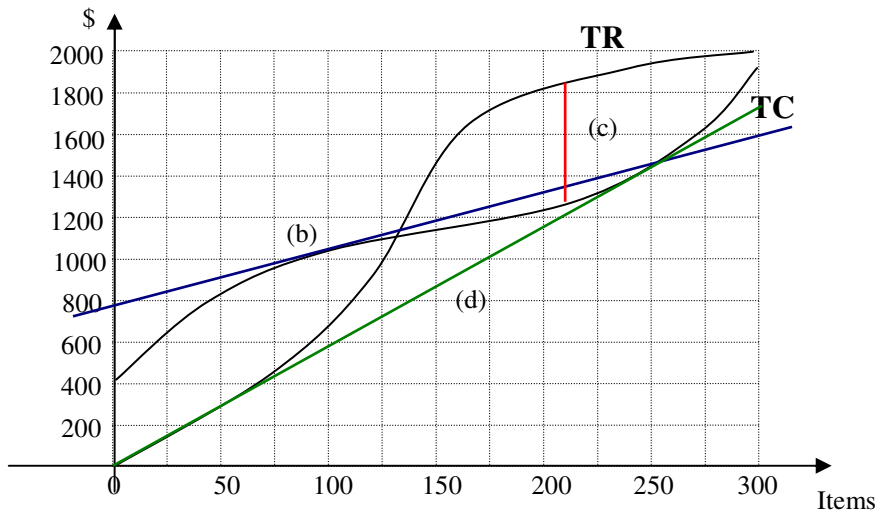
1000 shares would cost $10.39 \times 1000 = 10,390$

Answer: \$10,390.

(\$10,400 if you read the first dot as 0.25)

4 (20 points) The following are the graphs of the total revenue (TR) and the total cost (TC), in dollars, for producing and selling Items.

Note: In all questions below we accepted a range of values as correct, as long as correct work was shown and the lines/measurements used were not too far off.



a) Find the Average Revenue from selling 150 Items. Include correct units.

Work: $AR(150) = TR(150)/150 \approx 1450/150 = 9.67$

OR: Draw diagonal line to the graph of TR at $q=150$ & compute its slope.

Answer: $AR(150) = 9.67$ Units: \$ per Item

b) How much extra would it cost to produce the 101st Item, if you have already produced 100 Items?

Work:

This question is asking you to compute $MC(100)$, i.e. the slope of the tangent line at $q=100$ to the graph of TC. Pick 2 good points on this tangent line & compute the slope.

$rise/run = 200/75 \approx 2.67$.

Answer: It would cost an extra 2.67 dollars

c) Find the maximum profit, and at what quantity q it occurs.

Work:

Keep the ruler vertical & roll it, looking for the greatest vertical distance between TR (above) and TC (below). It occurs at about $q=220$ (range: 205-220). The greatest gap is equal to about the distance between 3 vertical tickmarks, i.e. about \$600.

Answer: Maximum profit is \$600 for $q = 210$ Items

d) For this total cost curve, what is the breakeven price in a market price situation?

Work:

Draw the diagonal line of lowest slope which intersects TC.

Looks like (175, 1000) is on this line, so the $BEP = slope = 1000/175 \approx 5.71$

Answer: $BEP = 5.71$ \$ per Item