Math 111 Exam 1
July 12, 2011

Name _____

Honor Statement

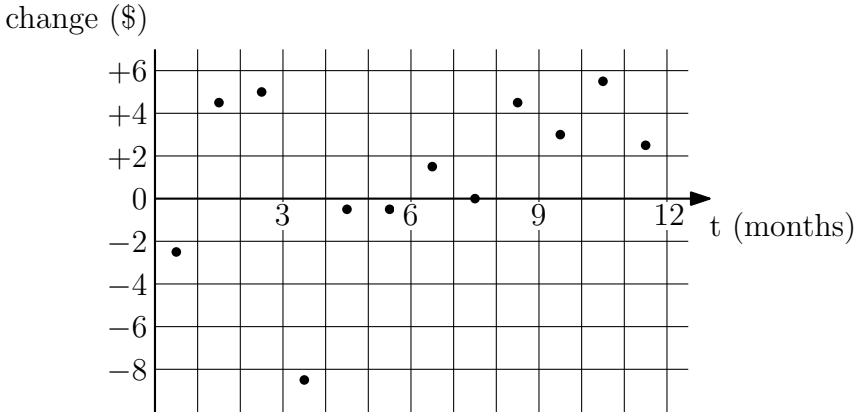
"I affirm that my work upholds the highest standards of honesty and integrity, and that I have neither given nor received any unauthorized assistance on this exam."

Signature _____

1	10
2	25
3	15
total	50

- Your test should have 3 problems on 4 pages (not including this one). Make sure that it does!
- Cell phones and any electronic items that aren't calculators must be turned off and put away.
- **Important:** Always show your work, unless the problem says not to. Make sure to draw and label any lines and points you use, and show your calculations. If you do not show your work, you may not receive credit, even if you find the correct answer.
- If a problem can be solved using a graphical method, you will not receive full credit for guess-and-check.
- You're allowed:
  - one double-sided $8\frac{1}{2}'' \times 11''$ sheet of notes
  - a ruler
  - a calculator
- Raise your hand if you have a question or can't understand a problem.

1. The graph on the right shows the approximate monthly **change** in crude oil prices, starting in January 2010. Each dot represents the change in crude oil price during one month. (The first dot represents the change in price from t = 0 months to t = 1 months, the second dot represents the change from t = 1 to t = 2, and so on.)



(a) If oil costs \$76/barrel at t = 9 months, what is its price at t = 6 months? At t = 11 months?

price at t = 6: _____

price at t = 11: _____

(b) Find the longest period of time over which oil prices are falling.

from t = _____ to t = _____

2. You take a road trip to Calgary, leaving at midnight. Let $D(t)$ represent the distance you have travelled after t hours.

(a) Each row in the table contains a phrase in one of our three "languages." Fill the blanks with the correct translations of each phrase. You don't need to do any calculations or show your work.

Intuitive Description	*Functional Notation*	*Graphical Notation*
	$D(10) - D(8)$	
		slope of secant line through $t = 3$ and $t = 7$
At 5:00, average trip speed is more than 30 miles/hour.		
	$\dfrac{D(t+2) - D(t)}{2} = 10$	

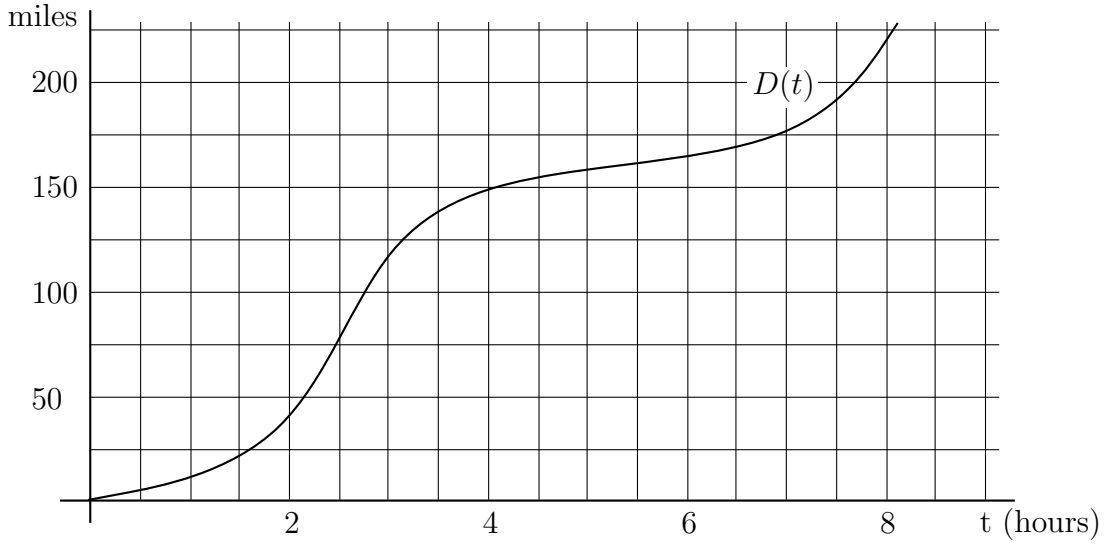
(b) The rest of your family is ahead of you, in another car. Let $F(t)$ represent the distance they have travelled after t hours.

Translate these statements into functional notation: (no need to show work)

Intuitive Description	*Functional Notation*
Your family is always 5 miles ahead of you.	
After t hours, you are in the same place your family was 1 hour earlier.	

(problem continues on next page)

2 (continued). Here is the graph of distance vs. time for your trip:



(c) At what time is your average trip speed the highest?

at t = _____

(d) Find a time t where $\frac{D(t+2)-D(t)}{2} = 50$.

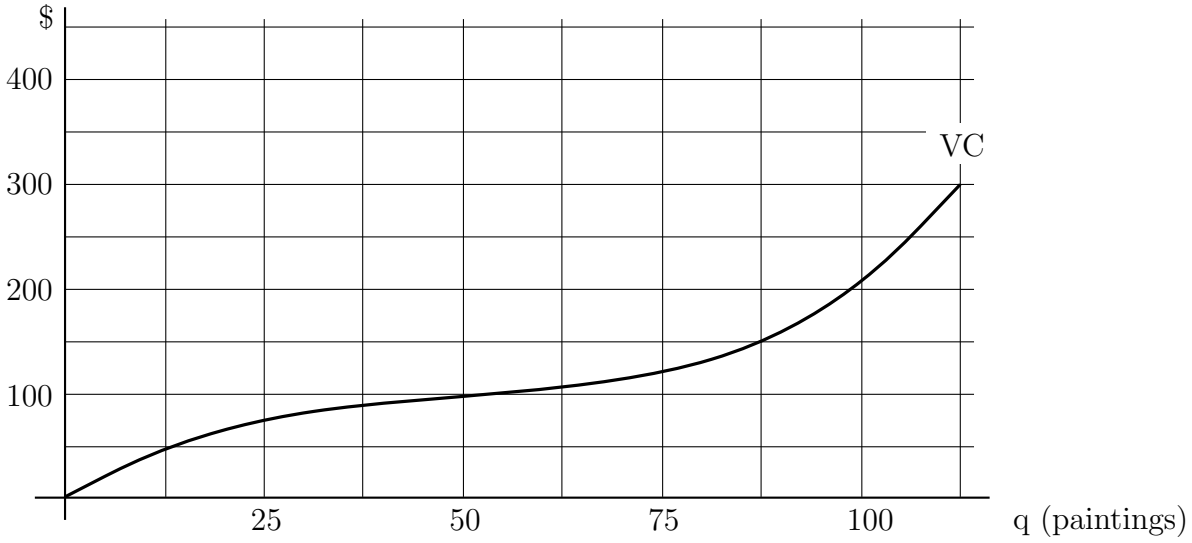
t = _____

(e) How far do you travel from t = 6 to t = 8? Find another 2-hour interval where you travel the same distance, *using a reference line.*

distance travelled: _____

t = _____ to _____

3. You sell bear paintings. Below is the graph of your *variable cost*.



(a) Suppose your fixed cost is \$100. Draw the graph of TC.

(b) What is the shutdown price?

SDP = _____

(c) Suppose the market price is \$3/painting. What is the maximum profit you can make?

profit = _____

(d) Now, suppose your fixed cost is \$200.

If the market price is still \$3/painting, you will always lose money, no matter how many paintings you sell. What *quantity* should you produce in order to minimize your loss?

q = _____