MATH 111
Exam II
Winter 2016

Name ______________________________

Student ID #________________ Section ________________

HONOR STATEMENT

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

SIGNATURE:______________________________

1	16	
2	17	
3	17	
Total	50	

- Check that your exam contains this cover sheet followed by three problems on four pages.
- You are allowed to use a TI30X-IIs calculator, a ruler, and one sheet of hand-written notes. All other sources are forbidden.
- Do not use scratch paper. If you need more room, use the back of the page and indicate to the grader you have done so.
- Turn your cell phone OFF and put it away for the duration of the exam.
- You may not listen to headphones or earbuds during the exam.
- You must show your work. Clearly label lines and points that you are using and show all calculations. The correct answer with no supporting work may result in no credit.
- If you use a guess-and-check method when an algebraic method is available, you may not receive full credit.
- When rounding is necessary, you may round your final answer to two digits after the decimal.
- There are multiple versions of the exam, you have signed an honor statement, and cheating is a hassle for everyone involved. DO NOT CHEAT.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (16 points) You sell Fleenets. The formulas for total revenue and total cost (in dollars) for selling/producing q Fleenets are:

$$TR(q) = -q^2 + 426q \text{ and } TC(q) = 150q + 11,250.$$

(a) Compute the marginal revenue at $q = 100$ Fleenets.

ANSWER: $MR(100) =$____________________dollars per Fleenet

(b) What is the largest possible profit for selling Fleenets?

ANSWER: ____________________dollars

(c) Find the longest interval of quantities on which total revenue is increasing.

ANSWER: from $q =$____________________to $q =$____________________Fleenets

(d) Find all values of q at which total revenue is equal to fixed cost. (Round your quantities to two digits after the decimal.)

ANSWER: (list all) $q =$____Fleenets

2. (17 points) A red car travels along a long, straight road. Its distance traveled (in miles) after t minutes is given by the function

$$R(t) = -0.01t^2 + 2t.$$

(a) The red car's average trip speed at time t is given by $\frac{R(t)}{t}$.
Find the time at which the red car's average trip speed is exactly 1.25 miles per minute.

ANSWER: $t =$ ____________________ minutes

(b) The red car's average speed during the 3-minute interval starting at time t is given by

$$\frac{R(t+3) - R(t)}{3}.$$

i. Compute $\dfrac{R(t+3) - R(t)}{3}$ and simplify as much as possible. Put a box around your final answer.

ii. Find a 3-minute interval during which the red car's average speed is exactly 1 mile per minute.

ANSWER: from $t =$ ____________________ to $t =$ ____________________ minutes

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THIS PROBLEM IS CONTINUED FROM THE PREVIOUS PAGE.

Again, the formula for the distance traveled by the red car is given by

$$R(t) = -0.01t^2 + 2t.$$

(c) There is a second car, a green car, whose distance traveled is given by $G(t)$, a **linear function** of time t.

The green car is in the same location as the red car at $t = 0$ and at $t = 20$ minutes. That is, $G(0) = R(0)$ and $G(20) = R(20)$.

i. Find the formula for $G(t)$, the distance traveled by the green car in t minutes.

ANSWER: $G(t) =$ ____

ii. Find all times at which the red car is exactly 0.3 miles ahead of the green car.

ANSWER: (list all) $t =$ ____ minutes

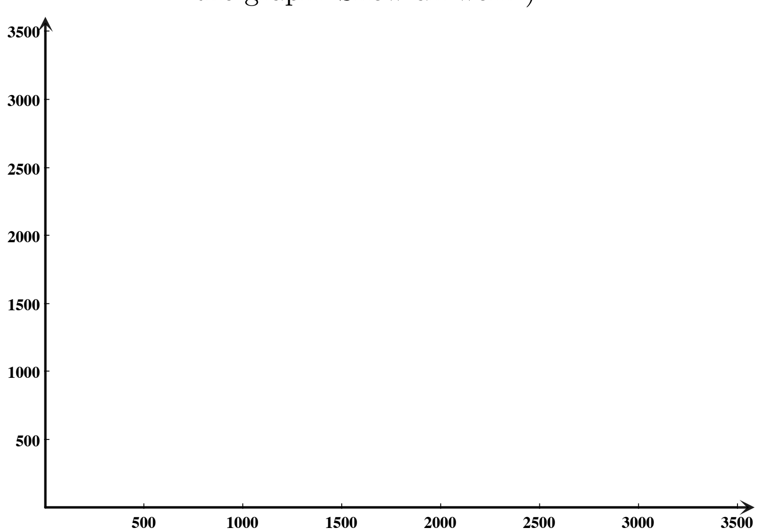
3. (17 points) Stella's Chip-n-Dip produces and sells tubs of salsa and guacamole. Each tub of salsa requires 0.75 pounds of tomatoes and 0.05 pounds of garlic. Each tub of guacamole requires 0.2 pounds of tomatoes and 0.1 pounds of garlic. Stella's suppliers can deliver at most 600 pounds of tomatoes and 144 pounds of garlic a day. (All other ingredients are available in unlimited supply.) Each tub of salsa earns \$0.90 profit and each tub of guacamole earns \$2 profit.

   Let x be the number of tubs of salsa Stella's produces and let y be the number of tubs of guacamole. We'll apply the method of linear programming to find maximum profit.

   (a) Two constraints are $x \geq 0$ and $y \geq 0$. List the remaining constraints.

   (b) Give a formula for the objective function.

   (c) Sketch and shade the feasible region on the axes below and list all of its vertices. (You should find the exact coordinates of the vertices rather than approximating them from the graph. Show all work.)



Vertices: ________________________________

   (d) What is the maximum possible profit? (Show all work.)

\$__________________