Math 112, Spring 2019, Midterm II

May 21, 2019

Name_____

TA/Section_____

Instructions.

- There are 4 questions. The exam is out of 40 points.

- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. It has to be the original and not a photocopy. **Hand in your notes with your exam paper.**

- You may only use a TI 30X IIS calculator.

- **Show your work**. If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. Please $\boxed{\text{BOX}}$ your final answer.

Copying from someone elses paper, using notes (unless expressly allowed by the teacher), altering an exam for re-grading, getting an advance copy of the examination, or hiring a surrogate test-taker are all flagrant violations of University policy.

Source: Student Academic Responsibility, University of Washington

Question	points
1	
2	
3	
4	
Total	

1. Evaluate the following integrals.

    (a) (3 points) $\int \frac{5}{x^2} - 3e^{0.2x} + \frac{5}{e^{4x}} + 2 \ dx$

    (b) (3 points) $\int_1^5 \frac{7}{\sqrt{3x+1}} \ dx$

    (c) (3 points) $\int \frac{1+2e^{5x}}{e^{3x}} \ dx$

2. The Marginal Revenue and Marginal Cost for producing and selling heat resistant, unbreakable, made from recycled material and recyclable water bottles is given by

$$MR(q) = -2q + 20 \qquad\qquad MC(q) = 0.4q^2 - 4q + 14$$

where MR and MC are in dollars per bottle and the quantity q is thousands of water bottles. Give units for your answers in (a)-(d).

(a) (3 points) What is the lowest value of Marginal Cost?

(b) (3 points) What is the largest possible Total Revenue?

(c) (5 points) Given that fixed costs are $12,000$, what is the maximum profit?

(d) (2 points) Sketch the graphs of MR and MC on the axes provided.

3
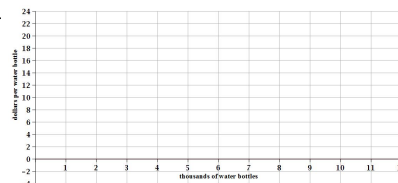
3. Given that the **derivative** of the function $f(t)$ is

$$f'(t) = t^2 - 11t + 28$$

answer the following.

(a) (5 points) What is the average rate of change of $f(t)$ between $t = 1$ and $t = 3$?

(b) (3 points) Where does the graph of $f(t)$ have a local maximum?

(c) (2 points) In which interval is the graph of $f(t)$ concave up?

4. (8 points) The demand function for glitter putty is given by

$$p = \frac{2170}{x+10}$$

where p is in dollars per pound and x is in pounds. The supply function is

$$p = 1 + 0.02x.$$

Find the consumer's surplus. Round your answer to the nearest cent.