Exam #3

November 6, 2018

Name _____

- You will be told when to begin the work and when to terminate work on the examination. You must stop when instructed. Points may be deducted in case of violations.

- Please show your work to support your answers that require calculations. Correct but unsupported answers may not be given full credit.

- The use of a cell phone or other electronic communication devices during the examination is not allowed. The exam will be canceled and a grade of "0" will be assigned to anyone who opens a cell phone during the examination or if one is found on their seat or hand.

No calculators are allowed!

Revenue function:	$R(x) = p * x$
Profit function:	$P(x) = R(x) - C(x)$
Elasticity of demand:	$E(p) = -\dfrac{p \cdot q'(p)}{q(p)}$

1. (7 pts) Find the elasticity of demand and determine whether the demand is elastic, inelastic, or unitary at the indicated price.

$$D(p) = \frac{100}{p^2}; p = 5$$

2. (20 pts) Find the absolute maximum and the absolute minimum of the given function on the given interval

(a) $f(x) = x^3 - 12x - 5$ on the interval $[0, 3]$

(b) $f(x) = x^2 + \frac{2}{x^2}$ on the interval $x > 0$

3. (15 pts) A carpenter has been asked to build a closed box with a square base. The sides of the box will cost $2 per square meter, and the base and top will cost $4 per square meter. What are the dimensions of the box of greatest volume that can be constructed for $48?

4. (5 pts) Suppose $10,000 is invested at an annual interest rate of 4%. Compute the future value of the investment after 10 years is the interest is compounded: [Leave your answers in calculator ready form.]

   (a) Annually

   (b) Quarterly

   (c) Continuously

5. (15 pts) A manufacturer has been selling flashlights at $6 apiece, and at this price, consumers have been buying 3,000 flashlights per month. The manufacturer wishes to raise the price and estimates that for each $1 increase in the price, 1,000 fewer flashlights will be sold each month. The manufacturer can produce the flashlights at a cost of $4 per flashlight. At what price should the manufacturer sell the flashlights to generate the greatest profit?

6. (5 pts) How quickly will money triple if it is invested at an annual rate of 5% compounded continuously? [Leave your answers in calculator ready form.]

7. (20 pts) Differentiate the given function.

(a) $f(x) = e^{x^2 - 3x}$

(b) $g(x) = x^2 \ln(2x)$

(c) $h(x) = \sqrt{2\ln(x) + x^5}$

8. (15 pts) Use logarithmic differentiation to find the first derivative

(a) $f(x) = (3 - x)^3 (x + 5)^4$

(b) $g(x) = \frac{x^4 (2x-3)^3 (x-1)^2}{(2-x)^4}$

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