Exam #3

March 29, 2019

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:	$E(p) = -\dfrac{p \cdot q'(p)}{q(p)}$
Future value of an investment:	$B(t) = P(1 + \frac{r}{k})^{kt}$ $B(t) = Pe^{rt}$
Effective interest:	$r_e = (1 + \frac{r}{k})^k - 1$ $r_e = e^r - 1$

1. (5 pts) Find the elasticity of demand and determine whether the demand is elastic, inelastic, or unitary at the indicated price.
$$D(p) = 100 - p^2; p = 5$$

2. (10 pts each) Find the absolute maximum and the absolute minimum of the given function on the given interval

   (a) $f(x) = 3x^4 + 8x^3 - 18x^2$ on the interval $[-1, 1]$

   (b) $f(x) = \frac{x}{x^2+1}$ on the interval $[0, 2]$

3. (15 pts) You managed to obtain 80 yards of fencing from your friend and you plan on using it to fence off a park in your neighborhood. The park is going to be fenced off on the three sides not adjacent to a street. What are the dimensions of the park for the area to be maximized.

4. (8 pts) How quickly will money double if it is invested at an annual interest rate of 10% if the interest is compounded: [Leave your answers in calculator ready form.]

   (a) Annually

   (b) Continuously

5. (15 pts) Your uncle Joe has a farm and he asked your to help him with the books. He sells calves (baby cow) and thinks that he can raise his revenue by decreasing the price of his calves. He currently sells 1000 calves for the price $150 per calf. He estimates that for each 1$ decrease in price, 20 more calves will be sold. What should he charge per calf to maximize his revenue?

6. (5 pts) What was the interest rate on a $10,000 investment that increased to $15,000 in 7 years if the compounding was quarterly? [Leave your answers in calculator ready form.]

7. (5 pts each) Differentiate the given function.

(a) $f(x) = e^{-x} + 4e^{2x}$

(b) $g(x) = \ln(4x^2 - x)$

(c) $h(x) = 2x\ln(1 - x)$

(d) $h(x) = e^x(x^2 - 3)$

8. (5 pts) Can the elasticity of demand be a negative value? Support your answer.

9. (15 pts) Use logarithmic differentiation to find the first derivative

   (a) $f(x) = \sqrt[5]{(3x+2)^2(x-8)^3}$

   (b) $g(x) = \frac{x^2(x^2+1)^5}{(1-x)^3}$

10. (0 pts) When did you start studying for this exam?

   last week   last weekend   Monday   Tuesday   Wednesday   Yesterday

11. (0 pts) Do you think that you could studied better? Why?   Yes   No

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