

Practice Test 2

BUSA130

This exam is graded out of 15 points. You must do Problem 1, and you may choose 6 other problems from Problems 2, 3, 4, 5, 6, 7, 8. Do not do all eight problems! Show all work necessary to solve the problems unless otherwise instructed. You have 65 minutes.

1) Revlon makes a line of mascara whose price is determined by the demand equation $p(x) = \frac{1500000}{0.05x + 1} - 1$. Find the marginal revenue function for this line of mascara (in terms of x) and compute $R'(24000)$. Should production be increased beyond 24000 units of mascara? (3pts)

2) Describe in a short paragraph what it would mean (in terms on inflation rates) for the Consumer Price Index $I(x)$ to have a positive first derivative and a positive second derivative. (2pts).

3) Find $\frac{dy}{dx}$ if y is implicitly defined as a function of x by the equation $xy + 2x^2y - 1 = y$ (2pts).

4) A supply equation for a car battery is given by $p = s(x) = 0.2\sqrt{x} + 15$. Use the differential to estimate how much the price will change when the supply is raised from 62500 to 67500. (2pts)

5) Identify a function $f(x)$ and a point $x = a$ so that the limit $\lim_{h \rightarrow 0} \frac{(2+h)^2 - 4}{h}$ can be calculated by $f'(a)$. Calculate the limit. (2pts)

6) Calculate the first derivatives of the following functions. (1pt each)

- $f(x) = \left(\frac{x+2}{1-2x}\right)^4$

- $f(x) = 2\sqrt{x}(2x^2 + 1)^3$

7) Determine if the following statements are true or false. If the statement is false, correct it to make it true. (0.5pts each)

- If demand is elastic, raising prices will raise revenue.
- Raising prices by 1% and observing a 0.5% decrease in quantity demanded would indicate that demand was inelastic.
- It is possible to make a profit on the 51st unit when $\overline{C}'(50)$ is positive.
- If $h(x) = f(3x)$, then $h''(x) = 6f(3x)$.

8) If $h(x) = 3f(x) - 2g(x) - x + 15$, $g'(2) = 0$, and $f'(2) = 1$, find the numerical value of $h'(2)$. (2pts)

Bonus: There will be a bonus question worth 0.5pts.