

QUIZ 7

1. Given the price-demand equation $p + 0.01x = 50$, (a) Find $E(p)$.

$$E(p) = \frac{p}{50 - p}$$

(b) What is the elasticity of demand when $p = \$10$? Is demand elastic, inelastic, or unit elastic at the indicated value of p ? Why?

$$E(10) = \frac{1}{4} < 1 \text{ and therefore inelastic}$$

(c) If this price is decreased by 5%, what is the approximate change in demand?

$$(.05)(.25) = .0125 \rightarrow \text{demand increases } 1.25\%$$

2. Calculus Coffeehouse sells coffee for \$2.40 per cup and sells 1,600 cups per day at that price. A survey shows that for every \$0.10 reduction in the price, 60 more cups will be sold. How much should be charged per cup in order to maximize revenue? (You must use calculus!)

$x =$ each \$0.10 reduction

$$R(x) = (2.4 - .1x)(1600 + 60x)$$

$2.40 - 0.10x =$ price/cup

$$= 3840 - 16x - 6x^2$$

$1600 + 60x =$ # cups

$$R'(x) = -16 - 12x = 0 \quad (\text{undefined nowhere})$$

Domain: $2.4 - .1x = 0$

$$x = -\frac{4}{3} \text{ not in domain!!}$$

$$.1x = 2.4$$

go to endpoints!

$$x = 24$$

$$[0, 24]$$

Sell coffee at \$2.40 per cup. Do not increase price.

3. Find all absolute extrema that exist for $f(x) = x + \frac{1}{x}$ on the following intervals:

(a) $[-1, 3]$

(b) $[-3, -1/2]$ continuous on the interval, use theorem

not continuous, so no theorem

$$f'(x) = 1 - \frac{1}{x^2} = \frac{x^2 - 1}{x^2}, \quad x = -1, 1, 0$$

only $x = -1$ is in the interval

$$\lim_{x \rightarrow 0^+} f(x) = \infty \Rightarrow \text{No AB MAX}$$

$$f(-3) = -3 \frac{1}{3}$$

$$\lim_{x \rightarrow 0^-} f(x) = \infty \Rightarrow \text{No AB MIN}$$

$$f(-1) = -2$$

$$f(-1/2) = -2 \frac{1}{2}$$

AB MAX of -2 at $x = -1$

AB MIN of $-3 \frac{1}{3}$ at $x = -3$