

## PS 1 - Answer Key

1

$$P = 20 - \frac{1}{200}Q$$

a)

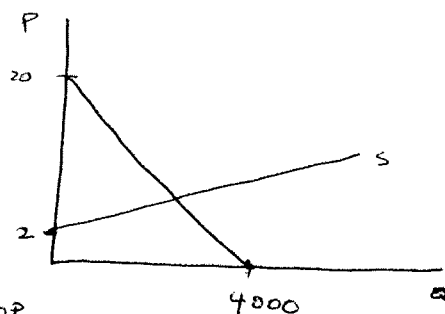
$$P = 2 + \frac{1}{400}Q$$

b)

$$400Q - 200P = -800 + 400P$$

$$4800 = 600P$$

$$P^* = 8 \quad Q^* = 2400$$



c)

$$\epsilon_d = \left| \frac{dQ}{dP} \cdot \frac{P}{Q} \right| = \left| -200 \cdot \frac{8}{2400} \right| = \frac{2}{3}$$

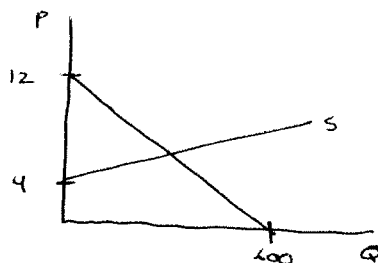
$$\epsilon_s = 400 \cdot \frac{8}{2400} = \frac{4}{3}$$

2

a)

$$P = 12 - \frac{1}{50}Q$$

$$P = 4 + \frac{1}{150}Q$$



b)

$$600 - 50P = -600 + 150P$$

$$1200 = 200P$$

$$P^* = 6 \quad Q^* = 300$$

$$c) \quad \epsilon_d = \left| -50 \cdot \frac{6}{300} \right| = 1$$

$$\epsilon_s = 150 \cdot \frac{6}{300} = 3$$

3

a)

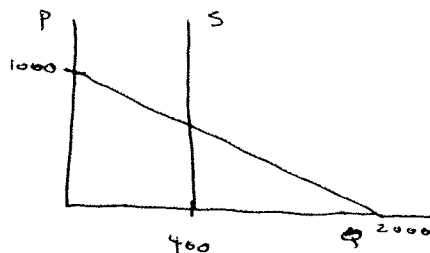
$$P = 1000 - \frac{1}{2}Q$$

b)

$$400 = 2000 - 2P$$

$$1600 = 2P$$

$$P^* = 800 \quad Q^* = 400$$



c)

$$\epsilon_d = \left| -2 \cdot \frac{800}{400} \right| = 4$$

$$\epsilon_s = 0$$

4

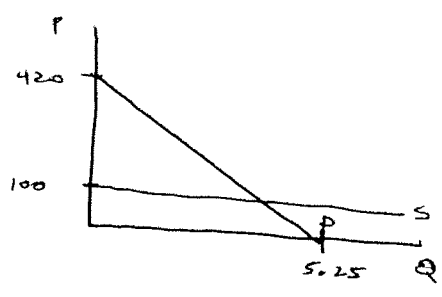
a)  $P = 420 - 80Q$

$P = 100$

b)  $100 = 420 - 80Q$

$80Q = 320$

$Q^* = 4 \quad P^* = 100$



c)  $\epsilon_d = \left| -\frac{1}{80} \cdot \frac{100}{4} \right| = .31$

$\epsilon_s = \infty$

5

a)  $\epsilon_d = \left| \frac{\Delta Q}{\Delta P_c} \cdot \frac{P_c}{Q} \right| = \left| -9.5 \cdot \frac{.45}{1275} \right| = .003$

b)  $\epsilon_{xy} = \frac{\Delta Q}{\Delta P_p} \cdot \frac{P_p}{Q} = 16.2 \cdot \frac{.31}{1275} = .004$

Substitutes (weak) since  $\epsilon_{xy} > 0$

c)  $\epsilon_I = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}$

If  $\epsilon_I > 0$ , then normal.

Since  $\frac{\Delta Q}{\Delta I} = .2 > 0$ , it is normal.

6

a)  $\frac{\partial f}{\partial x} = 2xy^2$

d)  $\frac{\partial f}{\partial x} = 12y^2x$

b)  $\frac{\partial f}{\partial x} = 2x + y^3$

e)  $\frac{\partial f}{\partial x} = \frac{1}{x}$

c)  $\frac{\partial f}{\partial x} = 10$

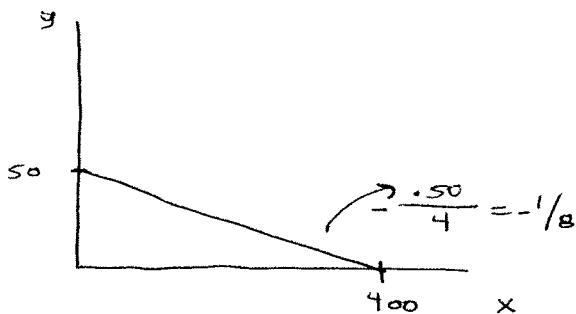
II

1

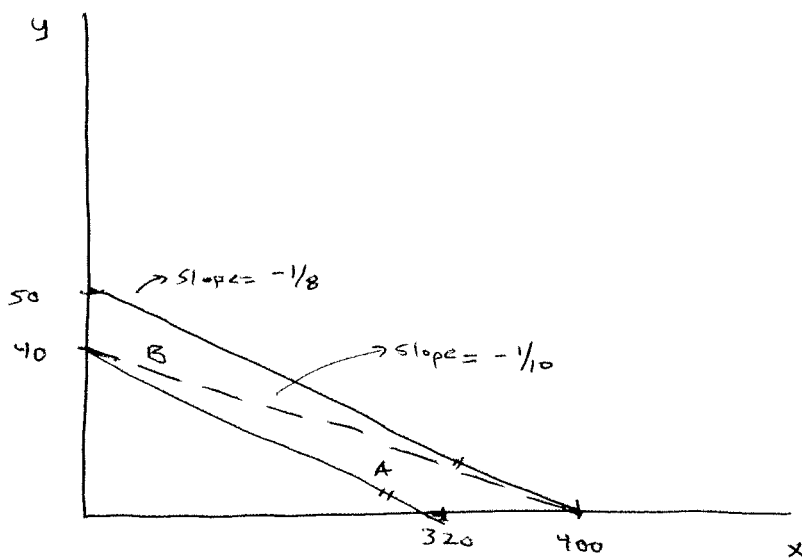
$x = \text{KK}$

$y = \text{Starbucks}$

$.50x + 4y = 200$



2



Plan A

$.50x + 4y =$

$200 - .20(200)$

$.50x + 4y = 160$

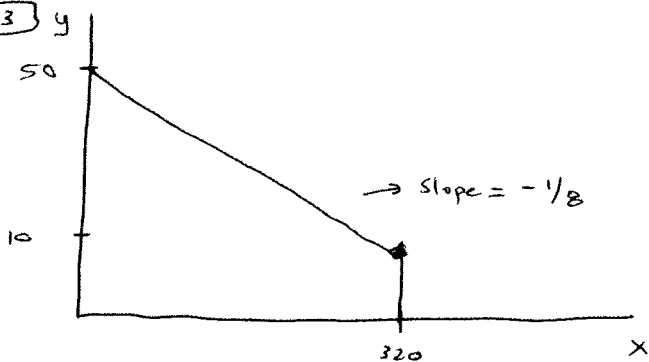
Plan B

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dashed line

$.50x + 5y = 200$

Town should choose A if its goal is to raise as much revenue as possible.

3



4

$P_{new} = 3$

$.50x + 3y = 160$

