Homework 6

Due: Friday April 25th, 11:59pm on Brightspace

- You must answer all questions for full credit
- Please submit a PDF with your answers to the course's Brightspace site
- You may work together in groups to discuss answers, but you may not copy a classmate's solution
- You must submit your own assignment - duplicate assignments will receive 0 credit
- Please put your name at the top of the first page of your assignment
- The textbook chapter most closely related to each question is indicated in parentheses.

Question 1: The market demand for paper clips is $Q_d = 50 - 0.5p$. The market supply for paper clips is $Q_s = -20 + 0.5p$.

a) What is the equilibrium price and quantity of paper clips in this market?
b) Plot and label the supply and demand curves for paper clips.
c) A breakthrough in paper clip manufacturing technology is discovered which reduces every paper clip manufacturing firm's marginal cost by $20. Plot the new curve(s) on your plot from part b. What is the new equilibrium price and quantity?

Question 2: Town A and town B have demands for mango given by the demand curves in Figure 1. Town A's curve is blue and dashed, town B's is red and solid.

a) Each demand curve has a constant price elastic of demand. Find the price elasticity of demand for each town. Hint: both elasticities are whole numbers, and using the mid-point equation for price elasticity of demand from HW8 will provide you with more accurate estimates:

$$\text{Mid-point formula: } \varepsilon = \frac{D_2 - D_1}{p_2 - p_1} \frac{\bar{p}}{\bar{D}}$$

$\bar{p} = \frac{p_2 + p_1}{2}$ and $\bar{D} = \frac{D_2 + D_1}{2}$ (the average price and demand between the two points)

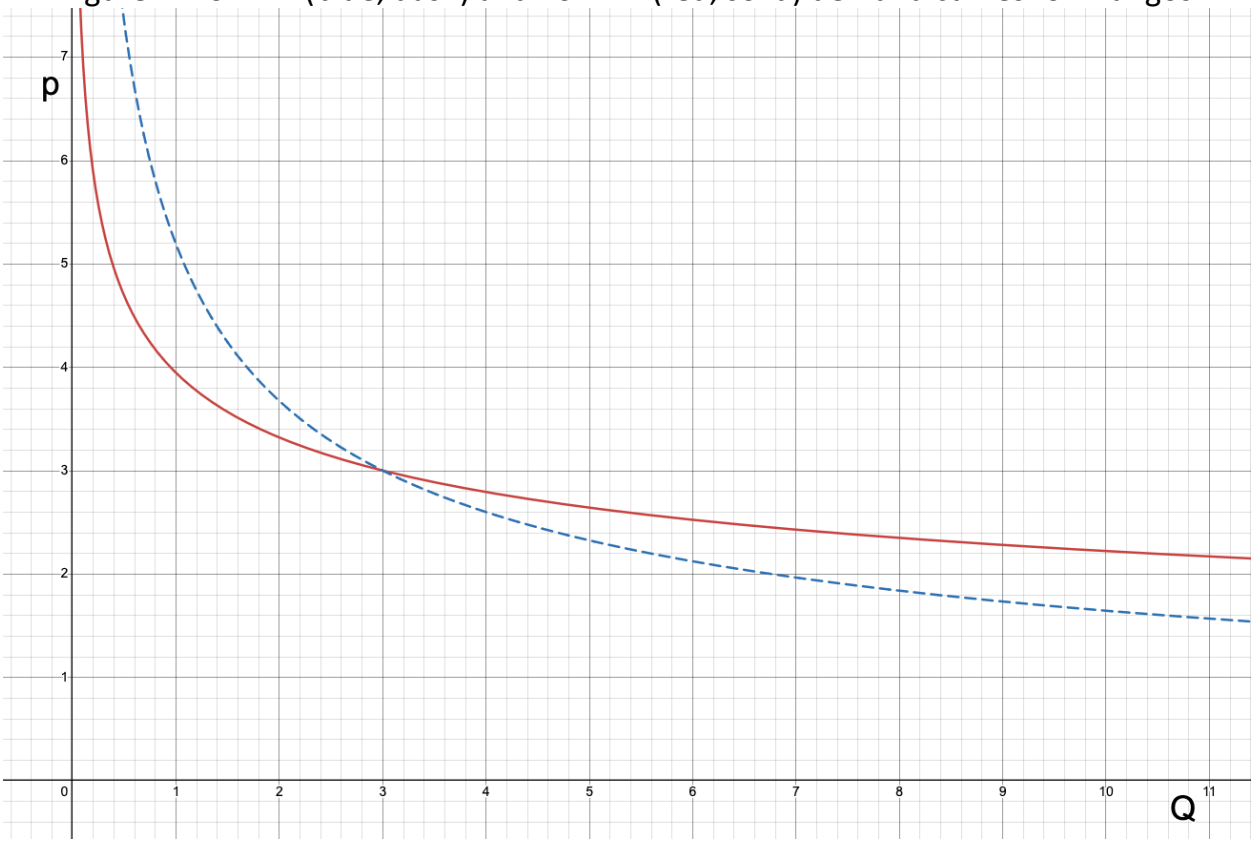
b) If the supply of mangos for both towns is $Q_s = p$, what is equilibrium price and quantity for each town?

c) If there is a mango blight reduces the supply of mangos, which city will have a larger change in equilibrium price? How does it relate to your answer in part a?

d) Assume the blight changes the supply to $Q_s = p - 3$. What are the new equilibrium price and quantity in each town?

e) Which town had the larger reduction in producer surplus due to the mango blight?

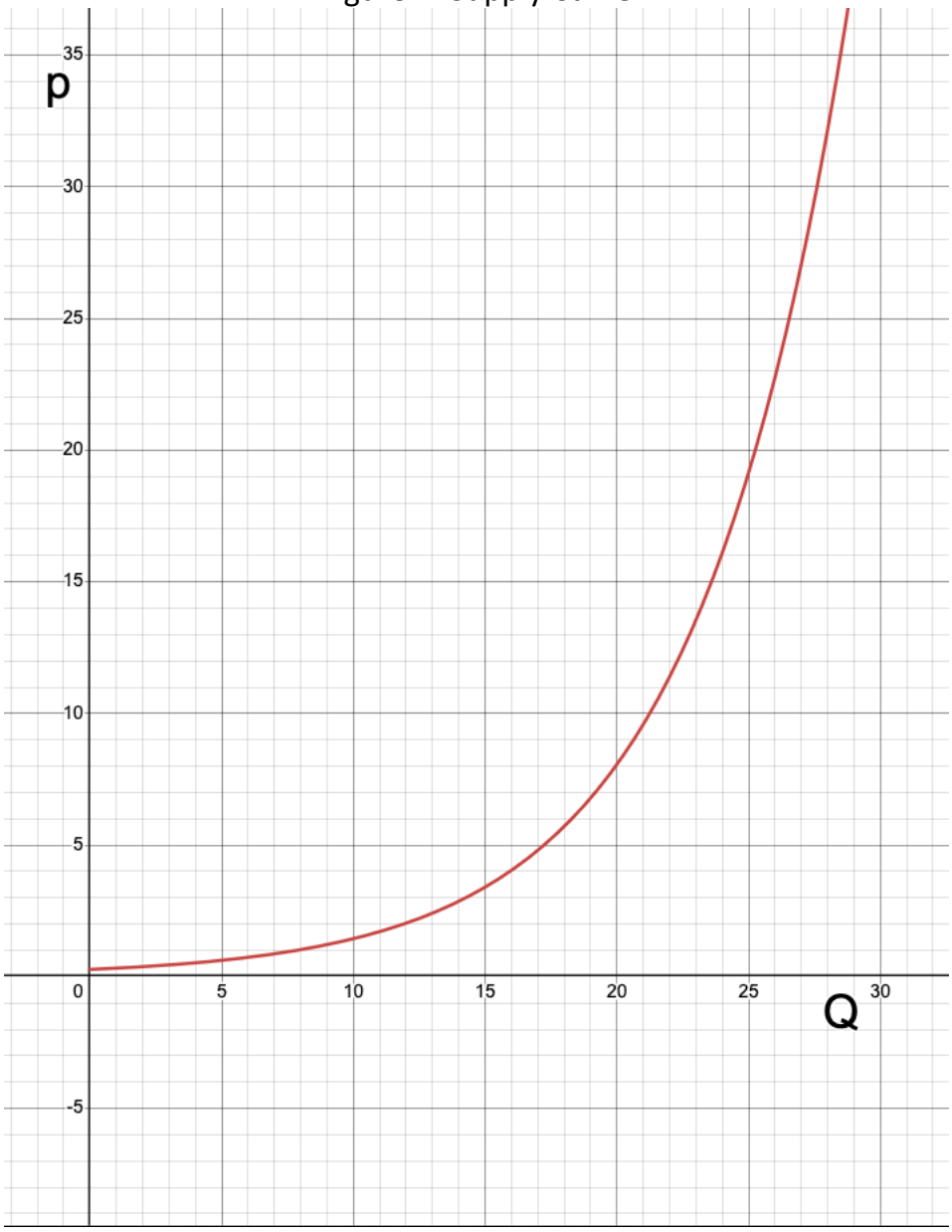
Figure 1: Town A (blue, dash) and Town B (red, solid) demand curves for mangos



Question 3: Figure 2 plots a supply curve. If you'd like to plot this supply curve yourself, the equation is $Q_s = 4\,log_2(p) + 8$.

a) If the demand curve for this market is $Q_d = 20 - p$, what is the equilibrium price and quantity?
b) The slope of the inverse supply curve at the equilibrium price is approximately 0.7. Plot a linear approximation of the supply curve with this slope that is tangent to the supply curve at the equilibrium price/quantity.
c) If the demand shifts to $Q_d = 25 - p$, find the new equilibrium price and quantity based on Figure 2 (or an equivalent graph you plot yourself). What would you have estimated the new equilibrium price and quantity to be if instead of using the actual supply curve, you used the linear approximation you plotted in part b?
d) If the demand shifts to $Q_d = 35 - p$, find the new equilibrium price and quantity based on Figure 2 (or an equivalent graph you plot yourself). What would you have estimated the new equilibrium price and quantity to be if instead of using the actual supply curve, you used the linear approximation you plotted in part b?
e) Comparing the accuracy of the linear approximation in part c to the linear approximation in part d, what do you conclude about the accuracy/usefulness of making linear approximation of supply and demand functions?

Figure 2: Supply Curve



Question 4: In this question assume we have monotone demand and supply curves with non-zero and non-infinite elasticity (regular supply/demand). Will equilibrium price and quantity increase, decrease, stay the same, or we can't say in each of the following scenarios? Briefly explain why.

a) Ice cream shops in the Florida Keys have an unusually cold and rainy day compared to their usual conditions. What will happen to the market for ice cream?
b) The government imposes a 50% subsidy for electric cars. What will happen to the market for electric cars?
c) The government imposes a 50% subsidy for electric cars. What will happen to the gasoline market?
d) During the pandemic, people wanted to more hand sanitizer, as a result, the government provides grants to firms that will produce hand sanitizer. What will happen to the market for hand sanitizer.