1. Use a supply/demand diagram to illustrate how each of the following shocks would affect the price and quantity sold of coffee. Draw a separate diagram for each shock.

a. The price of tea (a substitute for coffee) increases.
b. A study is released that links coffee consumption to cancer.
c. Cold weather kills off half of the Colombian coffee bean crop.
d. The price of styrofoam coffee cups (a complement to coffee) increases.

2. Use a supply/demand diagram to illustrate how each of the following shocks would affect the price and quantity sold of butter. Draw a separate diagram for each shock.

a. An increase in the price of margarine (a substitute for butter)
b. An increase in the price of bread (a complement to butter)
c. An increase in the price of milk (used to make butter)
d. A decrease in average household incomes (assume that butter is a normal good)

3. Consider a perfectly competitive market with the following supply and demand curves:

- $Q^D = 400 - 10P + 4I$
- $Q^S = -60 + 20P$,

where P is the product's price and I is the average income of the product's buyers, in thousands of dollars per year.

a. If I = 20, what is the equilibrium price and quantity?
b. If I = 20 and price is at its equilibrium level, what will the price elasticity of demand be? What will the income elasticity of demand be? What will the price elasticity of supply be?
c. If I = 40, what is the equilibrium price and quantity?
d. If I = 40, and price is at its equilibrium level, what will the price elasticity of demand be? What will the income elasticity of demand be? What will the price elasticity of supply be?

4. Consider a perfectly competitive market with the following supply and demand curves:

- $Q^D = 200 - 25P_B$
- $Q^S = -40 + 15P_S$

a. What are the equilibrium price and quantity for this market?
b. What are the price elasticities of supply and demand in equilibrium?
c. Suppose an excise tax of $2.00 per unit is placed on the sale of this good. What will the post-tax equilibrium buyers' price, sellers' price, and quantity be?
d. Who bears more of the burden of the tax: buyers or sellers? Explain.

e. Suppose, instead, that a subsidy of $2.00 per unit is to be paid to the sellers of this good. What would the post-subsidy equilibrium buyers' price, sellers' price, and quantity be?

f. Who enjoys more of the benefit of the subsidy: buyers or sellers? Explain.

5. Explain why the elasticity of demand for a product category (like yogurt) will be different than the elasticity of demand for a particular variety of that product (like Dannon yogurt). Which will have more elastic demand? Explain.

6. Suppose you observe that the (equilibrium) price of copper is $2.00 per pound and the (equilibrium) quantity sold is 20 million tons per year. From econometric studies, you know that the price elasticity of demand for copper is -0.25 and the price elasticity of supply is 1.20.

a. Find the equation for the linear demand curve that fits this information.

b. Find the equation for the linear supply curve that fits this information.

c. What would the new equilibrium price and quantity be if supply were to increase by 20% (i.e. – Q_2 = 1.2Q_1 at every price)?

7. Suppose the market for cigarettes in a particular town has the following supply and demand curves:

- $Q^D = 50 - P_B$
- $Q^S = P_S$,

where quantities are measured in 1000s of units (i.e. - 1 represents 1000, 2 represents 2000, etc.)
If the town wishes to raise $300,000 by placing an excise tax on the sale of cigarettes, how large should the excise tax be?

8. Suppose that demand for tickets to the local theatre comes from two distinct groups: the general public and students. Demand curves for each group are as follows:

- $Q_{GP} = 480 - 6P$
- $Q_S = 200 - 4P$

a. What is the equation for the *aggregate* demand curve for theatre tickets ($Q_{GP} + Q_S$ as a function of price)?

b. If both groups are to be charged the same price, what price maximizes sales revenue? How much revenue will be earned by the theatre at that price?

c. At the revenue-maximizing common price, what will the price elasticity of demand be for the general public? What will the price elasticity of demand be for students?

d. If the owners of the theatre can charge different prices to each group, what combination of prices will maximize sales revenue? How much revenue will be earned by the theatre at those prices?

e. Is the general public better off or worse off under the price discrimination scheme? Are students better off or worse off under the price discrimination scheme?

9. Suppose Congress agrees to pay consumers a per-unit *subsidy* for each fuel efficient car they purchase.

   a. Based on the supply/demand model, what will the subsidy do to the price consumers pay (net of the subsidy) for fuel efficient cars (up, down, or no change)? Explain.
   b. What will happen to the price sellers receive for those cars (up, down, or no change)? Explain.
   c. What will happen to the quantity of cars sold? Explain.

10. What is measured by a good's "price elasticity of demand"? Describe 3 determinants of the price elasticity of demand for a good.

11. Consider a perfectly competitive market in which supply and demand are as follows:

   - $Q^d = 80 - P_B$
   - $Q^S = 3P_S$

   a. What are the equilibrium price and quantity for this market?
   b. In equilibrium, how much consumer surplus will buyers get? What is producer surplus in equilibrium? Total surplus (consumer surplus + producer surplus)?
   c. If a tax of $4/unit is placed on the sale of this product, what will the new buyers' price be? The new sellers' price?
   d. In the post-tax equilibrium, what will consumer surplus be? Producer surplus?
   e. What will total surplus be in the post-tax equilibrium? *Hint: total surplus will include tax revenue raised.*
   f. What is the deadweight loss associated with this tax?

12. Suppose supply and demand in the market for low skilled labor are given by

   - $L^S = 150w$
   - $L^d = 1200 - 150w$,

where L denotes the quantity of labor expressed in millions of hours per month and w denotes the wage rate, expressed in dollars per hour.

   a. What are the equilibrium wage rate (w) and the equilibrium quantity of labor employed (L)?
   b. What is the aggregate surplus earned by workers (labor sellers) when the market is in equilibrium? What is the aggregate surplus earned by employers (labor buyers)? What is the total surplus (workers' surplus + employers' surplus) generated by the labor market?
   c. Suppose the government establishes a minimum wage at $1.00 above the market equilibrium wage (minimum wage = w* + 1). How many workers would be employed under the policy?
   d. How would the minimum wage policy affect the aggregate surplus earned by workers? The aggregate surplus earned by employers? Total surplus?
   e. Suppose that, instead of a minimum wage law, the government agreed to pay a subsidy of $1 per hour to each low-skilled worker. How would this policy affect the price employers pay for low-skilled labor? The price low-skilled workers receive for working? The quantity of labor employed?

f. How would the subsidy affect the aggregate surplus earned by workers? The aggregate surplus earned by employers? Total surplus (employers' surplus + workers' surplus – subsidy payments)?
g. Which policy would be preferred by workers? Which policy would be preferred by employers? Which policy results in the largest deadweight loss?

13. Antonio has $200 per month to spend on lunch. For lunch, he can buy a hamburger for $5 or a plate of chicken and rice for $8.

a. Write down the equation that describes Antonio's budget line.
b. What is the maximum number of hamburgers Antonio can purchase each month? What is the maximum number of plates of chicken and rice?
c. At these prices, what is the opportunity cost of a plate of chicken and rice, expressed in terms of hamburgers?
d. Draw Antonio's monthly budget line.
e. Suppose that the price of hamburgers increases by 5%, while the price of a plate of chicken and rice rises by 10%. If Antonio persuades his father to give him an extra $20 a month for lunches, what will his new budget line look like (draw it)?

14. Sarah has $50 per month to spend on apples and oranges. Each apple costs $0.40 and each orange costs $1.25.

a. Write down the equation that describes Sarah's monthly budget line.
b. What is the maximum number of apples Sarah can afford each month? What is the maximum number of oranges she can afford?
c. At these prices, what is the opportunity cost of an apple, expressed in terms of oranges?
d. Draw Sarah's monthly budget line.
e. What would Sarah's new budget line look like if the price of apples increased to $0.50 (draw the new budget line)?

15. Describe the four properties assumed of consumer preferences in typical microeconomic models of consumer choice. What does each property imply about the shape of the indifference curves in a typical indifference curve map?