1. In each case below, identify the effect on the market for steak.
(a) An increase in the price of lamb.
(b) A decrease in the population.
(c) An increase in consumer income.
(d) A decrease in the price of steak sauce.
(e) An increase in advertising by chicken producers.

2. In each case below, identify the effect on the market for coal.
(a) The development of a new, lower cost mining technique.
(b) An increase in wages paid to coal miners.
(c) The imposition of a $2 per ton tax on coal.
(d) A widespread news report that demand for coal will be much lower next year.
(e) A new government regulation requiring air purifiers in all work areas.

3. In a competitive labor market, demand for workers is \( Q^D = 9,900 - 100W \), and supply is \( Q^S = 2,000 + 1,900W \), where \( Q \) is the quantity of workers employed and \( W \) is the hourly wage.
Suppose the government decides to impose a wage ceiling of $3 per hour. What would the equilibrium in this labor market?

4. Suppose the market for potatoes can be expressed as follows:
\[
\text{Supply: } Q^S = -20 + 10p \\
\text{Demand: } Q^D = 400 - 20p
\]
(a) Solve for the equilibrium price and quantity.
(b) If the government sets a maximum price of $10 per unit, what will be the quantity demanded and quantity supplied?
(c) Suppose the government restricts the quantity to 100 units. What will be the price of potatoes?

5. During the winter of 1997-1998, the northeastern United States experienced warmer than usual conditions. The price of home heating oil was less than it was during the previous winter, but people bought less home heating oil. Does this contradict the Law of Demand? Explain.

6. Use a graph to show that the incidence of a $1/lb. tax on grapes is the same whether the tax is shown as a shift in the supply curve (tax on sellers) or the demand curve (tax on buyers). Under what circumstances would the incidence of the tax be split equally between buyers and sellers? (Hint see Equation 3.7 p. 63).

7. Use supply-and-demand graphs to explain why parking is free at the suburban shopping mall but one typically must pay to park when shopping downtown.
8. Suppose demand for inkjet printers is estimated to be \(Q = 1000 - 5p + 10p_X - 2p_Z + 0.1Y\). If \(p = 80\), \(p_X = 50\), \(p_Z = 150\), and \(Y = 20,000\); answer the following:

a) What is the price elasticity of demand?

b) What is the cross price elasticity with respect to commodity \(X\)? Give an example of what commodity \(X\) might be.

c) What is the cross price elasticity with respect to commodity \(Z\)? Give an example of what commodity \(Z\) might be.

d) What is the income elasticity?

9. During the winter of 1997-1998, the northeastern United States experienced warmer than usual conditions. The price of home heating oil was less than it was during the previous winter, but people bought less home heating oil. This contradicts the Law of Demand.

10. What happens to the equilibrium price and quantity of coffee when there is a leftward shift of the supply curve for tea? Explain.

11. Is it better to give poor people cash or food stamps? Use an indifference curve model to show the case for a consumer who would prefer cash to food stamps.

12. The market demand curve for bus rides in a small community is given by \(P = 100 - (Q/10)\), where \(P\) is the fare per ride in cents and \(Q\) is the number of rides purchased each day. If the price is 50 cents per ride, how much revenue will the transit system collect each day? What is the price elasticity of demand for bus rides? If the system needs more revenue, should it raise or lower its price? How would your answers have differed if the initial price had been 75 cents per ride.

13. The market for digital video disks (DVDs) has supply and demand curves given by \(P = 2Q^s\) and \(P = 42 - Q^d\), respectively. Suppose state government levies a tax of $9 on each DVD sold, collected from sellers.

a. What quantity of DVDs will be sold in equilibrium?

b. What price do buyers pay?

c. How much do buyers now spend in total?

d. How much tax revenue does the government collect?

e. Show the above results graphically.

14. A hot dog vendor faces a daily demand curve of \(Q = 1800 - 15P\), where \(P\) is the price of a hot dog in cents and \(Q\) is the number of hot dogs purchased each day.

a. If the vendor has been selling 300 hot dogs each day, how much revenue has he been collecting?

b. What is the price elasticity of demand for hot dogs?

c. The vendor decides that he wants to generate more revenue. Should he raise or lower the price of hot dogs?

d. At what price would he achieve maximum total revenue?
15. Suppose that the demand curve for a gasoline is given by the equation
   \[ P = 3 - 0.02Q \]
   and the supply curve is given by the equation
   \[ P = -1.5 + 0.025Q, \]
   where \( P \) represents the price of the gasoline (measured in dollars per unit) and \( Q \) represents the quantity of the gasoline (measured in billion gallons per year).

   a. Find the equilibrium price and quantity for this market.
   b. Suppose the government imposes a excise tax of $0.50 per gallon. Find the new equilibrium quantity, the post-tax price received by sellers, and the post-tax price paid by demanders.
   c. How much revenue does the government collect?
   d. What fraction of the burden of this tax is borne by demanders? Suppliers?

16. Consumer Popeye eats 4 pounds of spinach per day at a price of $1/pound. When the price rises to $1.25/pound, his neighbor feels sorry for him and gives him an extra dollar per day as compensation. Popeye is exactly as well off as before.

17. Suppose that the average household in a state consumes 500 gallons of gasoline per year. A 10-cent gasoline tax is introduced, coupled with a $50 annual tax rebate per household. Will the household be better or worse off after the new program is introduced?

18. Estée Lauder Enterprises has developed a new product called the Re-Nutriv. The market demand for this product is given as follows:
   \[ Q = 360 - 6P \]

   a. At what price is the price elasticity of demand equal to zero?
   b. At what price is demand infinitely elastic?
   c. At what price is the price elasticity of demand equal to one?
   d. If Re-Nutriv is priced at $90, what is the point price elasticity of demand?

19. The U.S. Department of Agriculture is interested in analyzing the domestic market for corn. The USDA's staff economists estimate the following equations for the demand and supply curves:
   \[ Q_d = 1,600 - 125P \]
   \[ Q_s = 440 + 165P \]
   Quantities are measured in millions of bushels; prices are measured in dollars per bushel.

   a. Calculate the equilibrium price and quantity that will prevail under a completely free market.
   b. Calculate the price elasticities of supply and demand at the equilibrium values.
   c. The government currently has a $4.50 bushel support price in place. What impact will this support price have on the market? Will the government be forced to purchase corn under a program that requires them to buy up any surpluses? If so, how much?
20. The food stamp program provides low income households with coupons which can be exchanged for some specified dollar value worth of food. Many economists argue that this program is an inefficient means of increasing the well being of low income families. Proponents of this view argue that an equivalent cash subsidy would bring about a greater increase in the well being of the low income families receiving aid. Although many economists hold this view, not all policy analysts agree with the advocates of cash payments instead of food stamps. Advocates of the existing program argue that food stamps provide an incentive for low income families to increase the nutritional quality of their diets.

a. Carefully analyze the arguments regarding increases in well being under cash payments and food stamp programs. Use graphical analysis to present your arguments.

b. Do food stamps insure that low-income families increase their consumption of food?

21. Hulk goes to the gym 20 times a month. His income is $1,000 per month and his visits to the gym cost $4 per visit.

a. Draw Hulk's budget line for visits to the gym and all other goods, show the consumption bundle that maximizes his satisfaction, and draw the indifference curve tangent to that point.

b. Recently, a new health club opened which offers identical facilities but which charges a flat fee of $60 per month plus an additional $1 per visit. Draw Hulk's budget line if he were to join this new club.

c. Would Hulk continue to work out at the gym or would he join the new health club. Why?

22. Suppose that the government subsidizes housing expenditures of low-income families by 50 percent. The Cunninghams qualify for this subsidy and spend a total of $500 per month on housing: they spend $250 of their own and receive a government subsidy of $250. Recently, a new policy has been proposed that would provide each low income family with a housing voucher worth $250. The voucher can be used only for housing consumption, but can be augmented with cash payments if families so choose. Using a graph, demonstrate whether the Cunninghams would prefer the current program, the proposed program, or would be indifferent between the two.

23. Antonio buys 8 new college textbooks during his first year at school at a cost of $50 each. Used books cost only $30 each. When the bookstore announces that there will be a 20 percent price increase in new texts and a 10 percent increase in used texts for the next year, Antonio’s father offers him $80 extra. Is Antonio better off or worse off after the price change?

24. Suppose the price of cheeseburgers has recently risen from $3 to $4 per burger, while the price of coke has fallen from $2 to $1 per bottle. During this time, Meghan’s income has stayed fixed at $60 per week. Before the price changes, Meghan had been buying 12 cheeseburgers and 12 cokes per week. Since the price changes, she has been buying 10 burgers and 20 cokes per week. Assuming Meghan’s preferences have not changed, is it possible to say whether the price changes have made Meghan better off or worse off? Explain.