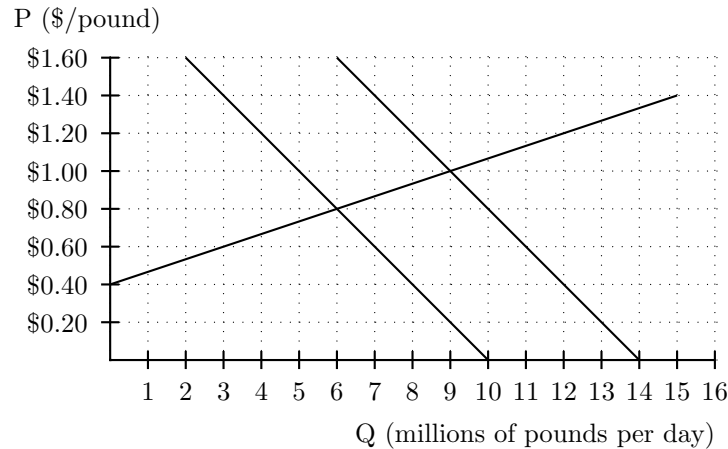


## Comprehensive Final Exam **Answer Key**

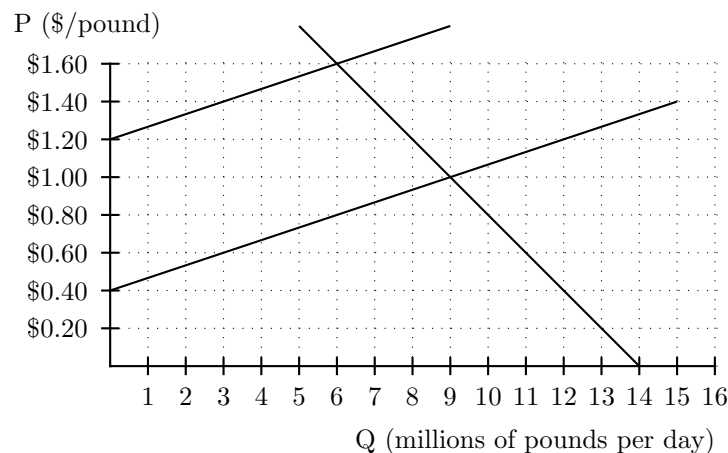
1.
  - (a) Demand increases. Equilibrium price up, equilibrium quantity up.
  - (b) Supply decreases. Equilibrium price up, equilibrium quantity down.
  - (c) Supply increases. Equilibrium price down, equilibrium quantity up.
  - (d) Demand decreases. Equilibrium price down, equilibrium quantity down.
2. The amount that buyers want to buy at the market equilibrium price is equal to the amount that sellers want to sell at that price. At a lower price, buyers want to buy more units than sellers want to sell; this creates incentives that push the price up towards equilibrium. At a higher price, sellers want to sell more units than buyers want to buy; this creates incentives that push the price down towards equilibrium.
3.
  - (a) During bad years the supply decreases (i.e., shifts to the left), so point X is the equilibrium during bad years.
  - (b) Total revenue is  $p \cdot q$ . At point X this is  $4 \cdot 1.20 = \$4.8$  million per day. At point Y this is  $8 \cdot .80 = \$6.4$  million per day. At point Z this is  $14 \cdot .20 = \$2.8$  million per day.
  - (c) Profits are higher during “bad” years! During “good” years there is a Prisoner’s Dilemma-type situation for orange growers: they’d make more money if they reduced their harvest (thereby driving up the equilibrium price), but the individual incentives are such that they all produce a lot.
4.
  - (a) See figure.



- (b) At a price of, say, \$.80, buyers actually have to pay \$1.60 after tax, so with a market price of \$.80 and an \$.80 tax they should be willing to buy as much as they were willing to buy at a price of \$1.60 without the tax. Similarly, with a market price of \$.40 and a \$.80 tax they should be willing to buy as much as they were willing to buy at a price of \$1.20 without the tax.
- (c) The new equilibrium price is \$.80 per pound. Since sellers received \$1.00 per pound originally, they are getting \$.20 less than before. Buyers used to pay \$1.00 per pound; now they pay \$.80, but they pay an additional \$.80 in taxes, so they effectively pay \$1.60 per pound. This is \$.60 more than before.
- The ratio of the tax burdens is  $\frac{T_B}{T_S} = \frac{.6}{.2} = 3$ .
- (d) The price elasticity of supply is  $\frac{5}{3} \approx 1.66$ ; the price elasticity of demand is  $\frac{-5}{9} \approx -.556$ . Their ratio is  $-3$ , which is of the same magnitude as the ratio of the tax burdens!

5. It wouldn't change at all. This is the *tax equivalence* result.

6. See figure.



7. (a) Yes: trees are capital. You need to figure out if you'll make more money investing in the trees (by letting them grow) or investing in the bank (by cutting down the trees and putting the money in the bank, where it will grow at the rate of interest).
- (b) No: the amount you spent to plant the trees is a **sunk cost**.
8. (a) There are a number of examples in the text of payoff matrices that represent the Prisoners' Dilemma.

- (b) Anything from the traffic problem to the pollution problem to the public-private investment game to the original prisoner's dilemma which gives the problem its name.
9. (a) The game tree starts with three lines representing Player 1's choices: offer 1, 2, or 3 ounces of cake. Each of these three lines leads to two lines representing Player 2's response if that choice is made: accept (in which case they split the cake according, e.g., (3,1) if Player 1 offers Player 2 one ounce of cake) or reject (in which case the outcome is (1.5,1.5) as specified in the problem).
- (b) The predicted outcome is that Player 1 offers Player 2 a (2,2) split and Player 2 accepts. If Player 1 offers Player 2 any less, Player 2 can reject and get (1.5,1.5), and if Player 2 rejects the (2,2) offer then she'll only get 1.5 ounces of cake.
- The predicted outcome is Pareto efficient, and in fact all accepted outcomes—(3,1), (2,2), and (1,3)—are Pareto efficient. The outcome (1.5,1.5) is Pareto inefficient; a Pareto improvement over it is (2,2).
10. (a) Using the annuity formula we get a present value of about \$6 trillion.
- (b) The expected damages are  $\frac{1}{3}(6) + \frac{1}{3}(3) + \frac{1}{3}(0) \approx \$3$  trillion.
- (c) Plug \$3 trillion into the present value formula to get a present value of \$59 billion.