

## Week-In-Review #1 (1.2 [Review], 1.3, 1.4, 1.5)

1. Find the equation of the line that passes through the point  $(-1, 2)$  and
  - (a) has slope  $= 5/2$ .
  - (b) also passes through the point  $(3, -4)$ .
  - (c) has slope  $= 0$ .
  - (d) has undefined slope.
  
2. Find the equation of the line which crosses the  $x$ -axis at 2 and the  $y$ -axis at  $-3$ .
  
3. The Acme Widget Co. produces regular and deluxe widgets out of wood. Each regular widget requires 2 units of wood; each deluxe widget requires 4 units of wood. There are 600 units of wood available for production each week.
  - (a) Assuming that all available units of wood are used up each week, write down a linear equation in general form ( $Ax + By + C = 0$ ) relating the number of regulars produced ( $x$ ) and the number of deluxes produced ( $y$ ).
  - (b) Write the equation in slope-intercept form ( $y = mx + b$ ).
  - (c)
    - (i) If the co. wants to make 10 less regulars, what does that do to the production of deluxes?
    - (ii) If the co. wants to make 10 less deluxes, what does that do to the production of regulars?
    - (iii) In general, how are the production levels of the different widgets related?
  - (d) What are the maximum number of regulars that may be produced? Deluxes? How do these maximums appear in the graph of the equation?
  
4. A compressor was bought for \$9,000. According to the depreciation schedule, the value of the compressor will drop by the same amount every year until 10 years have passed, at which point the compressor has only salvage, or scrap, value. The value of the compressor after two years is \$7,300.
  - (a) Find  $V(t)$ , the value of the machine after  $t$  years. ( $0 \leq t \leq 10$ )
  - (b) What is the rate of depreciation of the compressor?
  - (c) What is the salvage, or scrap, value of the compressor?
  - (d) Determine the value of the compressor after 15 years.

5. A company making keys has fixed costs of \$15,000 each month. It costs this company \$1 to make each key and each key sells for \$5.

- (a) Find the linear cost, revenue, and profit functions for this company.
- (b) How much will the company profit if 2500 keys are made and sold?
- (c) How many keys must be sold in a month in order to have a profit of \$10,000?
- (d) How many keys must be sold in a month in order for this company to make a profit gain?

6. A gadget company finds that the daily total cost of producing 200 gadgets is \$14,000. It also finds that if no gadgets are produced, the company still has a daily cost of \$10,000. Each gadget sells for \$26.

- (a) What is the production cost per gadget?
- (b) Find the company's linear cost, revenue, and profit functions.
- (c) Find the break-even point for the co. and explain its meaning.  
Is this a "true" break-even point?

7. A manufacturer of timers, has a monthly fixed cost of \$48,000 and a production cost of \$8 for each timer manufactured.

- (a) What is the selling price of the timers, if the company has a profit of \$112,000 when selling 5,000 timers?
- (b) What is the profit function for the company?

8. Given  $x$  = the number of figurines supplied or demanded per month and  $p$  = unit price of the figurines in dollars and Equation 1 is  $-5x + 2p = 60$  and Equation 2 is  $3x + 2p = 300$ , answer the following:

- (a) Which equation is the demand equation? Why?
- (b) How many units will consumers demand if the figurines are free?
- (c) What is the highest price consumers are willing to pay for the figurines?
- (d) Suppliers will only provide the figurines if the price is above what value?
- (e) Find the equilibrium point for the market and write a sentence explaining the *meaning* and *importance* of the *values* of the *coordinates* of this point, in the context of the problem.

9. Suppliers will market 500 books when the unit price is \$25. Consumers will demand 10,000 books if they are free. For each dollar rise in the price of a book, consumers will demand 200 fewer books, while producers will supply 100 additional books.

- (a) Find the linear demand and supply equations.
- (b) What is the equilibrium point for the book market? Explain its meaning.

10. On the planet of Mathetopia, city populations and newspaper readership were determined. The following table gives the population of a city (in millions of people) vs. the number of people who read the newspaper in the city (in hundreds of people):

Population	0.52	0.78	1.33	1.85	2.46
Readers	75	128	135	175	200

- (a) Determine the equation of the least-squares line for this data. Round all coefficients/constants to four decimal places.
- (b) Is this a good representation of the data? Why or why not?
- (c) Interpret the slope of your model.
- (d) Estimate the number of newspaper readers, to the nearest person, when the city has a population of 958,000.
- (e) Determine the population of a city, to the nearest person, if the newspaper readership is found to be 35,000 people.