Work-out Problems

Study-tip: show all your work!

Exercise 1. Solve the following matrix equation for the matrix X.

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}^{\mathrm{T}} + X = -3 \begin{bmatrix} 6 & 3 \\ 7 & -1 \end{bmatrix}$$

Exercise 2. Simplify down to a single matrix:

$$\begin{bmatrix} y-3 & x \\ 0 & -1 \end{bmatrix} \begin{bmatrix} -4 & 7 & 1 \\ 5 & -2 & 0 \end{bmatrix} + 10 \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}^{\mathrm{T}}$$

Exercise 3. Complete each of the following. Sketch all lines, without using a calculator.

1. Plot and label the point $(1, -3)$. In which quadrant is this point?
2. Draw and label the graph of the line with equation $x - 5y = 20$.
3. Write the equation of the line that passes through the point $(1, -3)$ and has slope -5.
4. Draw and label the line found in Part 3 on the same graph.

Exercise 4. The quantity demanded (x) of hot dogs sold at an Aggie football game is 6000 per game when the unit price (p) is \$3.25. For each decrease in unit price of \$2 below \$3.25, the quantity demanded increases by 3000 units.

1. Assuming linear demand, find the demand equation for hot dogs at the game.

2. How many hot dogs would consumers demand if they were free?

Exercise 5. Given the two points $(3, -2)$ and $(7, -2a)$.

1. Find the y-intercept of the line passing through the two points.

2. Find the x-intercept of the line passing through the two points.

Exercise 6. You are the new financial advisor of Sassy Creations, the new trend-setting luxury jeweler. Unfortunately, their accounting practices are somewhat haphazard. The manager remembers that they have fixed costs of \$20,000. You noticed that a batch of 200 of their very exclusive *Queen Rev* pendants cost the company \$50,000. Their total profit from selling the 200 pendants was \$45,000. Let x stand for the number of pendants produced and sold. Assume linear cost and revenue functions. Find the cost, revenue, and profit equations for Sassy Creations. Graph all three equations on the same graph.

Exercise 7. An insurance company purchases an SUV for its employees. The original cost is \$30,500. The SUV will depreciate linearly over 5 years, after which it will have a scrap value of \$10,300.

1. What is the rate of depreciation? Answer with a complete sentence, using the correct units.

2. Find a linear model that describes the value of the SUV at the end of t years of use (denoted $V(t)$), where $0 \leq t \leq 5$.

3. Find and interpret the vertical intercept of $V(t)$.

4. What will the SUV's value be at the end of the third year?

Multiple Choice Problems

Study tip: Write out all your work when you complete the multiple-choice problems.

Multiple Choice 1. The demand equation for a company is $p = d(x) = 625 - 3x$, where p denotes the price per unit and x denotes the number of units demanded. Find the number of units demanded when the unit price is \$175.

(a) 800 units

(b) 625 units

(c) 175 units

(d) 150 units

(e) 100 units

Multiple Choice 2. Living Active, a gym accessory production company, produces foam rollers for \$10 per unit. They sell each foam roller for \$23. Their monthly fixed costs are \$136,500. Which of the following statements is **false**? (There is only one false statement.)

(a) Living Active earns a profit when 15,300 foam rollers are produced and sold.

(b) Living Active earns a profit when 12,500 foam rollers are produced and sold.

(c) Living Active undergoes a loss when 11,000 foam rollers are produced and sold.

(d) Living Active breaks even when 10,500 foam rollers are produced and sold.

(e) Living Active undergoes a loss when 7,500 foam rollers are produced and sold.

Multiple Choice 3. The rock band *Ross's Midnight Aggies* has gained much popularity across the country. They buy a bus to travel to their destinations. The purchase price is \$185,000. The bus will depreciate linearly, and will then have a scrap value of \$75,000 after 10 years. What is the rate of depreciation of the bus?

(a) The bus loses value at a rate of \$110,000 per year.

(b) The bus loses value at a rate of \$65,065 per year.

(c) The bus loses value at a rate of \$27,500 per year.

(d) The bus loses value at a rate of \$11,000 per year.

(e) There is not enough information to determine.

Multiple Choice 4. Luddington's is not too eager to supply its Wellington Boots at basement bargain rates, and accordingly controls the supply according to the formula $x = 50p - 1995$ pairs per week, where p is the price in dollars. Which of the following statements is **true**? (There is only one true statement).

(a) Raising the price by \$50 results in one more pair supplied per week.

(b) Raising the price by \$50 results in 1995 more pairs supplied per week.

(c) Raising the price by \$50 results in one less pair supplied per week.

(d) Raising the price by \$1 results in 50 less pairs supplied per week.

(e) Raising the price by \$1 results in 50 more pairs supplied per week.

Multiple Choice 5. A line has x-intercept $(3, 0)$. On the line, as y increases by 2 units, x decreases by 6 units. Find the equation of the line.

(a) $y = \frac{1}{3}x - 1$

(b) $y = -\frac{1}{3}x + 1$

(c) $y = -3x + 3$

(d) $y = -6x + 2$

(e) There is not enough information to determine.