Chapter 8 Practice Exercises (*Optional)

8-01 Nonlinear and Linear Systems

1. Find out how to solve by graphing on your graphing utility. Write the steps.

Solve by graphing.

2. $\begin{cases} 2x + y = 3 \\ x - 3y = 5 \end{cases}$

3. $\begin{cases} x - 2y = -1 \\ 3x + 4y = -3 \end{cases}$

4. $\begin{cases} 3x + y = 1 \\ 2x + 2y = 6 \end{cases}$

5. $\begin{cases} x^2 + y = 3 \\ x + y = 3 \end{cases}$

6. $\begin{cases} 2x - y^2 = 0 \\ x^2 + y^2 = 8 \end{cases}$

7. $\begin{cases} y = x^2 - 4 \\ y = -x^2 - 2 \end{cases}$

Solve by substitution.

8. $\begin{cases} 3x + y = 7 \\ 4x - 5y = 22 \end{cases}$

9. $\begin{cases} 3x + 2y = 7 \\ x + 4y = 19 \end{cases}$

10. $\begin{cases} 3x - 5y = -6 \\ x - y = -1 \end{cases}$

11. $\begin{cases} 5x + y = -5 \\ -7x + 3y = -3 \end{cases}$

12. $\begin{cases} y = 2x^2 \\ y = -3x + 5 \end{cases}$

13. $\begin{cases} x^2 - 3y = -2 \\ 2x + y = -1 \end{cases}$

14. $\begin{cases} \frac{x^2}{9} + \frac{y^2}{4} = 1 \\ 2x + 3y = 6 \end{cases}$

Problem Solving

15. A ski jumper leaves the end of the ski jump headed upward along a parabolic trajectory that can be modeled by $y = -\frac{1}{10}x^2 + 2x$ in meters. The ski slope falls away in a straight line 45° below the horizontal that can be modeled by $y = -x$. Measuring down the slope, how far from the end of the jump does the skier land on the surface?

Mixed Review

16. (7-09) Write the polar equation of a parabola with directrix $y = 10$.

17. (6-03) Given $\vec{p} = \langle 1, 3 \rangle$ and $\vec{q} = \langle -2, 2 \rangle$, find $2\vec{p} - \vec{q}$.

18. (5-04) Find all the solutions of $2 \sin 2x - \sqrt{3} = 0$.

19. (4-02) Evaluate $\tan \frac{11\pi}{6}$ without using a calculator.

20. (3-03) Use the change-of-base formula and a calculator to evaluate $\log_3 28$.

8-02 Two-Variable Linear Systems

Check to see if the given point is a solution to the system.

1. $\begin{cases} x + 6y = -5 \\ 3x + 2y = 1 \end{cases}$; (1, -1)

2. $\begin{cases} 2x - y = \frac{11}{2} \\ 3x + 2y = 9 \end{cases}$; $\left(3, \frac{1}{2}\right)$

Solve the system of equations and classify.

3. $\begin{cases} x + 4y = 0 \\ 3x - y = 13 \end{cases}$

4. $\begin{cases} 7x - 5y = -35 \\ 2x + 2y = 14 \end{cases}$

5. $\begin{cases} 4x + 9y = -4 \\ -2x - 6y = 3 \end{cases}$

6. $\begin{cases} 5x - 3y = 11 \\ -4x + \frac{12}{5}y = \frac{41}{5} \end{cases}$

7. $\begin{cases} y = -3x + 2 \\ x = -\frac{1}{2}y - \frac{1}{2} \end{cases}$

8. $\begin{cases} 17x + 34y = 2 \\ -51x - 68y = -9 \end{cases}$

9. $\begin{cases} \frac{2}{3}x - \frac{5}{3}y = \frac{7}{3} \\ y = 0.4x - 1.4 \end{cases}$

10. $\begin{cases} -15x + 16y = 29 \\ 5x - 12y = -18 \end{cases}$

Problem Solving

11. The Old Testament specified that people had to sacrifice a lamb at the temple for forgiveness of sins, but if they were poor, people could sacrifice a pair of doves. Two groups of travelers went to the temple and needed to purchase their sacrifices. The first group purchased 2 lambs and 3 pairs of doves for a total of \$50.70 in today's dollars. The second group purchased 4 lambs and 1 pair of doves for \$81.90. The groups tried to find out how much they were charged per lamb and pair of doves.
    a. How much were the people charged per lamb and pair of doves?
    b. Look up Mark 11:15-19. What did Jesus do when he saw this?
    c. What should the temple have been?

12. Sally sells 10 shells at the seashore. A tourist paid her \$2 for each perfect shell and \$0.50 for each broken shell. If Sally received \$11, how many of each type of shell did Sally collect and sell?

13. Jill wants to make 10 L of 20% bleach solution by mixing some 10% solution and some 50% solution. How much of each type of solution should she use?

14. The soccer club has two fee plans. Plan A is a \$100 member fee and \$5 per game you play. Plan B is no member fee but \$15 per game you play. How many games will you have to play for both plans to cost the same and how much will that cost?

15. Johnny invests \$500 in two accounts that earn 1% and 0.5% interest. If he earns to \$4.25 in interest, how much did he deposit in the accounts?

Mixed Review

16. (8-01) Solve by substitution: $\begin{cases} x + y = 7 \\ y = x^2 + 1 \end{cases}$

17. (8-01) Solve by graphing: $\begin{cases} x - y = 1 \\ y = \frac{1}{x - 1} \end{cases}$

18. (7-09) Write a polar equation of an ellipse with $e = \frac{1}{3}$ and directrix $x = -5$.

19. (7-07) Graph the polar coordinates: $A\left(4, \frac{2\pi}{3}\right)$ and $B\left(-3, \frac{3\pi}{2}\right)$.

20. (6-05) Evaluate $\langle 1, -4 \rangle \cdot \langle 6, 3 \rangle$.

8-03 Multivariable Linear Systems

Perform the indicated row operations. What did it accomplish?

1. $\begin{cases} 2x - y - 3z = 0 \\ x + 2y - z = 3 \\ x + y + z = 1 \end{cases}$
Interchange the first two equations.

2. $\begin{cases} 2x - 3y + 2z = -1 \\ -2x + y + z = 5 \\ 3x + 2y + 2z = 1 \end{cases}$
Add equation 1 to equation 2 and replace equation 2.

3. $\begin{cases} x - 3y + 2z = -2 \\ x + 2y + 2z = -1 \\ x - y - z = 4 \end{cases}$
Add −1 times equation 1 to equation 3 and replace equation 3.

Solve using Gaussian Elimination.

4. $\begin{cases} x + 3y - 2z = -3 \\ y + z = 5 \\ z = 1 \end{cases}$

5. $\begin{cases} 2x + y + 2z = 4 \\ y + 3z = 4 \\ z = -2 \end{cases}$

6. $\begin{cases} 2x + y - z = -1 \\ 2y + 3z = -1 \\ x + y = -1 \end{cases}$

7. $\begin{cases} x - 5y + 2z = -11 \\ x + 4y + z = 7 \\ -x + 2y + z = 5 \end{cases}$

8. $\begin{cases} x - y + z = 8 \\ 2x + y + z = 8 \\ x + y + z = 6 \end{cases}$

9. $\begin{cases} x + y + 2z = 1 \\ -2x - y - 3z = 2 \\ 4x + 5y + 9z = 8 \end{cases}$

10. $\begin{cases} x + z = -2 \\ x + y - 2z = -1 \\ 3x + y = 8 \end{cases}$

11. $\begin{cases} 3x + y - 3z = -18 \\ 2x - 2y + z = 17 \\ -2x + y - 2z = -21 \end{cases}$

12. $\begin{cases} 2x - y + z = 2 \\ -2x + 3y + 2z = -1 \\ 4x + 5z = 2 \end{cases}$

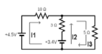
13. $\begin{cases} x + 2y - 7z = 5 \\ y + z = 3 \end{cases}$

14. $\begin{cases} x + 2y + z = 1 \\ 2x + 2y + z = 4 \end{cases}$

Problem Solving

15. Three friends went to a Mexican fast food restaurant. Joe bought 3 tacos, 2 burritos, and a drink for $6.25. Frank bought 5 tacos and 4 burritos for $7.75. He forgot to buy a drink so Samantha bought an extra drink. She bought 2 tacos, 2 burritos, and 2 drinks for $7.50. How much does Frank owe Samantha for the drink?

16. In electrical circuit analysis, it is important to know the currents through each part of a circuit. Kirchhoff's Laws are used to generate a system of equations to find the currents. For this diagram, the Junction Rule says the total current into a junction equals the total current leaving a junction. This generates the 1st equation in the system below. The Loop Rule says that for any complete loop, the voltage rises equals the voltage drops. This generates the 2nd and 3rd equations below. Solve the system of equations to find the size of the currents (I_1, I_2, and I_3).



$$\begin{cases} I_1 + I_2 - I_3 = 0 \\ 10I_1 \quad + 5I_3 = 4.5 \\ 3I_2 + 5I_3 = 3.4 \end{cases}$$

Mixed Review

17. (8-02) Solve the system of equations $\begin{cases} \frac{1}{2}x + 3y = -1 \\ y = \frac{1}{4}x - \frac{5}{4} \end{cases}$

18. (8-01) Solve by substitution $\begin{cases} x = y^2 \\ x + 3y^2 = 1 \end{cases}$

19. (7-05) Classify the conic $2x^2 - 3xy + 2y^2 - 5x + 7y + 10 = 0$.

20. (6-03) If $\overrightarrow{m} = \langle 2, 5 \rangle$ and $\overrightarrow{n} = \langle -3, -1 \rangle$, find $\overrightarrow{m} + 2\overrightarrow{n}$.

8-04 Partial Fractions

1. What are partial fractions?

Write the partial fractions, but do not solve for *A*, *B*, *C*, etc.

2. $\frac{x}{x^2+3x+2}$

3. $\frac{4}{x^2-6x+9}$

4. $\frac{x^2+4}{x^3+x^2+5x+5}$

Find the partial fractions.

5. $\frac{x+13}{x^2-4x-21}$

6. $\frac{8x+20}{x^2+6x+5}$

7. $\frac{9x+1}{2x^2+x}$

8. $\frac{2x+5}{x^2+2x+1}$

9. $\frac{-7x+33}{x^2-10x+25}$

10. $\frac{5x^2-21x+32}{x^3-8x^2+16x}$

11. $\frac{4x^2+3x+4}{x^3+x}$

12. $\frac{3x^2+x-6}{x^3+x^2-3x-3}$

13. $\frac{3x^2-x+1}{(x-2)(x^2+2x+3)}$

14. $\frac{4x^3-20x+1}{(x^2-5)^2}$

15. $\frac{2x^4+3x^3+17x^2+11x+32}{x(x^2+4)^2}$

Mixed Review

16. (8-03) Solve by Gaussian Elimination $\begin{cases} x + y + z = 5 \\ 2y - z = -2 \\ -3y + 2z = 5 \end{cases}$

17. (8-03) Is this in Row Echelon Form? If not, why? $\begin{cases} x + 3y - z = 7 \\ 2y + 7z = 3 \\ 0 = 0 \end{cases}$

18. (8-02) Is $(-1, 2)$ a solution to $\begin{cases} 2x + 3y = 4 \\ -x + 2y = 5 \end{cases}$?

19. (8-01) Solve by graphing $\begin{cases} y = 2x + 1 \\ y = -3x + 6 \end{cases}$

20. (7-09) Classify the conic $r = \frac{2}{2+3\sin\theta}$

8-05 Systems of Inequalities

1. What does consumer surplus and producer surplus indicate?

Solve the system of inequalities and label the vertices of the solution area.

2. $\begin{cases} y \geq 2x - 2 \\ y \leq \frac{1}{2}x + 1 \\ y \geq -2 \end{cases}$

3. $\begin{cases} x - y > -2 \\ x < 3 \\ y > -3 \end{cases}$

4. $\begin{cases} 4x + y \geq -6 \\ x - 4y \geq -10 \\ x + y < 5 \end{cases}$

5. $\begin{cases} y > x^2 - 5 \\ y > -x - 3 \end{cases}$

6. $\begin{cases} y > (x-1)^2 - 4 \\ y \leq -(x+2)^2 + 5 \end{cases}$

7. $\begin{cases} x^2 + y^2 \leq 16 \\ y \leq -|x| + 4 \end{cases}$

8. $\begin{cases} \dfrac{x^2}{16} + \dfrac{(y-1)^2}{9} \geq 1 \\ y \leq -\dfrac{1}{3}x^2 + 2 \end{cases}$

Find the consumer surplus and producer surplus for the demand and supply equations.

9. $\begin{cases} p = 90 - x \\ p = 10 + x \end{cases}$

10. $\begin{cases} p = 120 - 3x \\ p = 30 + 2x \end{cases}$

Mixed Review

11. (8-04) Write the partial fractions for the rational expression, but do not solve for the variables: $\frac{x+2}{x^3-2x}$.

12. (8-04) Write the partial fractions for $\frac{3x+2}{x^2+2x}$.

13. (8-03) Solve $\begin{cases} x - 2y + z = 4 \\ y + z = 6 \\ z = 5 \end{cases}$.

14. (8-02) An instrument company makes guitars and is starting production on a new model. It has a one-time cost of $10,050 to set up the factory production line and materials cost $150 per guitar. The company is going to sell the the guitars for $300 each. How many guitars do they need to sell to break even, where the costs equal the revenue?

15. (8-01) Solve by substitution $\begin{cases} \dfrac{x^2}{4} + y^2 = 1 \\ y = 2x \end{cases}$.

8-06 Linear Programming

1. What is meant by unbounded constraints? Draw an example.

Use linear programming to find the maximum and minimum (if possible) of the objective function given the constraints.

2. Objective function: $z = 2x + y$
Constraints: $\begin{cases} x + y \geq 2 \\ x \leq 2 \\ y \leq 2 \end{cases}$

3. Objective function: $z = y - x$
Constraints: $\begin{cases} 0 \leq x \leq 4 \\ y \geq 1 \\ y \leq \frac{1}{2}x + 1 \end{cases}$

4. Objective function: $z = x + 3y$
Constraints: $\begin{cases} 1 \leq x \leq 3 \\ 2 \leq y \leq 4 \end{cases}$

5. Objective function: $z = \frac{1}{2}x + y$
Constraints: $\begin{cases} 0 \leq y \leq 6 \\ x \geq 0 \\ y \geq 2x - 4 \end{cases}$

6. Objective function: $z = x + 2y$
Constraints: $\begin{cases} 0 \leq x \leq 10 \\ 0 \leq y \leq 6 \\ y \leq -x + 15 \end{cases}$

7. Objective function: $z = \frac{1}{2}x + \frac{1}{3}y$
Constraints: $\begin{cases} x + 2y \leq 20 \\ 4x + y \leq 38 \\ x \geq 0 \end{cases}$

8. Objective function: $z = x + y$
Constraints: $\begin{cases} x + y \geq 4 \\ x \geq 1 \\ y \geq 2 \end{cases}$

Problem Solving

9. You need to buy some filing cabinets for your office storage. You know that Cabinet A costs $20 each, takes 2 ft^2 of floor space, and holds 4 ft^3 of files. Cabinet B costs $60 per unit, takes 1 ft^2 of floor space, and holds 6 ft^3 of files. You have been given a $600 budget. The office only has floor space for 30 ft^2 of cabinets. How many of each model should you buy, in order to maximize storage volume?

10. A small company makes two different brackets. It takes 5 screws and 2 bolts to make bracket X. And it takes 2 screws and 4 bolts to make bracket Y. The factory has 100 screws and 80 bolts delivered every day. The company makes a profit of $1 per bracket X and $2 per bracket Y. Use linear programming to determine the ideal numbers of each type of bracket they should produce per day, assuming that they are able to sell everything they produce.

Mixed Review

11. (8-05) Describe how to graph a system of linear inequalities.

12. (8-04) Find the partial fractions for $\frac{3x+2}{x^2+x}$.

13. (8-03) Solve the system of equations $\begin{cases} x+2y+z=6 \\ y+z=2 \end{cases}$

14. (8-01) Solve by substitution $\begin{cases} x^2+y^2=16 \\ x+y=0 \end{cases}$

15. (7-07) Convert the polar equation to rectangular: $r = 4\cos\theta$.

8-Review

Take this test as you would take a test in class. When you are finished, check your work against the answers. On this assignment round your answers to three decimal places unless otherwise directed.

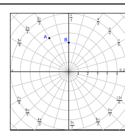
1. Solve by substitution: $\begin{cases} x^2-y=0 \\ 4x+y=-4 \end{cases}$
2. Solve by substitution: $\begin{cases} \frac{1}{2}x+y=4 \\ 2x+\frac{1}{2}y=9 \end{cases}$
3. Solve by graphing: $\begin{cases} y=-x^2+4x \\ y=-x+4 \end{cases}$
4. Solve by graphing: $\begin{cases} x^2+y^2=45 \\ x+2y=0 \end{cases}$
5. Solve by elimination: $\begin{cases} 3x+2y=19 \\ 5x-3y=0 \end{cases}$
6. Solve by elimination: $\begin{cases} 6x+18y=5 \\ 4x-2y=1 \end{cases}$
7. Solve by elimination: $\begin{cases} 2x-2y+z=-6 \\ 3x+y-z=-11 \\ y+2z=10 \end{cases}$
8. Solve by elimination: $\begin{cases} x-3y+z=7 \\ -x+4y+z=-6 \\ 2x-8y-2z=18 \end{cases}$
9. Solve by elimination: $\begin{cases} x+3y-4z=2 \\ 2x-y+z=1 \end{cases}$
10. Write as partial fractions: $\frac{x-8}{x^2-x-2}$
11. Write as partial fractions: $\frac{3x+20}{x^2+12x+36}$
12. Write as partial fractions: $\frac{5x^2+x+12}{x^3+4x}$
13. Sketch the graph of the inequalities: $\begin{cases} y<x+3 \\ y<-2x+6 \\ y>-4 \end{cases}$
14. Sketch the graph of the inequalities: $\begin{cases} y\geq x^2-5 \\ y\leq -\frac{1}{2}x+3 \end{cases}$
15. Find the maximum and minimum values of the objective function $z=x+3y$ and where they occur, subject to the following constraints.
$\begin{cases} x+y\leq 10 \\ x-y\geq -4 \\ x\geq 0 \\ y\geq 0 \end{cases}$
16. Bob and Joanna go to a food truck whose prices are not clearly displayed. Bob buys 2 tacos and 3 burritos and pays \$5.55. Joanna buys 3 tacos and 1 burrito and pays \$4.86. How much does the food truck charge for each taco and burrito?

Answers

8-01

1. Answers will vary but probably includes "intersect" command.
2. (2, −1)
3. (−1, 0)
4. (−1, 4)
5. (0, 3), (1, 2)
6. (2, 2), (2, −2)
7. (−1, −3), (1, −3)
8. (3, −2)
9. (−1, 5)
10. $\left(\frac{1}{2}, \frac{3}{2}\right)$
11. $\left(-\frac{6}{11}, -\frac{25}{11}\right)$
12. $\left(-\frac{5}{2}, \frac{25}{2}\right)$, (1, 2)
13. (−5, 9), (−1, 1)
14. (0, 2), (3, 0)
15. $x = 30$, $y = -30$. Use Pythagorean theorem to find distance, $30\sqrt{2} \approx 42.4$ m.
16. $r = \frac{10}{1+\sin\theta}$
17. ⟨4, 4⟩
18. $x = \frac{\pi}{6} + \pi n, \frac{\pi}{3} + \pi n$
19. $-\frac{\sqrt{3}}{3}$
20. 3.033

8-02

1. Yes
2. No
3. (4, −1)
4. (0, 7)
5. $\left(\frac{1}{2}, -\frac{2}{3}\right)$
6. No solution
7. (3, −7)
8. $\left(\frac{5}{17}, -\frac{3}{34}\right)$
9. Many solutions
10. $\left(-\frac{3}{5}, \frac{5}{4}\right)$
11. Lamb: \$19.50, Doves: \$3.90; you look it up
12. 4 perfect, 6 broken
13. 2.5 L of 50%, 7.5 L of 10%
14. 10 games, \$150
15. \$350 at 1%, \$150 at 0.5%
16. (−3, 10), (2, 5)
17. (0, −1), (2, 1)
18. $r = \frac{5}{3-\cos\theta}$
19. 

20. −6

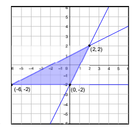
8-03

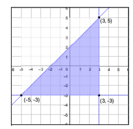
1. $\begin{cases} x+2y-z=3 \\ 2x-y-3z=0 \\ x+y+z=1 \end{cases}$; Created a leading coefficient of 1 in the 1st equation
2. $\begin{cases} 2x-3y+2z=-1 \\ -2y+3z=4 \\ 3x+2y+2z=1 \end{cases}$; Eliminated the first term in the 2nd equation
3. $\begin{cases} x-3y+2z=-2 \\ x+2y+2z=-1 \\ 2y-3z=6 \end{cases}$; Eliminated the first term in the 3rd equation
4. (−13, 4, 1)
5. (−1, 10, −2)
6. (1, −2, 1)
7. (−1, 2, 0)
8. (2, −1, 5)
9. $(-a-3, -a+4, a)$
10. No solution
11. (2, −3, 7)
12. No solution
13. $(9a-1, -a+3, a)$
14. $(3, -a-1, 2a)$
15. \$2
16. $I_1 = 0.2$ A, $I_2 = 0.3$ A, $I_3 = 0.5$ A
17. (2.2, −0.7)
18. $\left(\frac{1}{4}, \frac{1}{2}\right), \left(\frac{1}{4}, -\frac{1}{2}\right)$
19. ellipse
20. ⟨−4, 3⟩

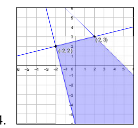
8-04

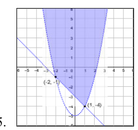
1. Splitting a rational expression into a sum of smaller rational expressions each with a single factor in the denominator.
2. $\frac{A}{x+2} + \frac{B}{x+1}$
3. $\frac{A}{x-3} + \frac{B}{(x-3)^2}$
4. $\frac{A}{x+1} + \frac{Bx+C}{x^2+5}$
5. $\frac{2}{x-7} + \frac{-1}{x+3}$
6. $\frac{3}{x+1} + \frac{5}{x+5}$
7. $\frac{7}{2x+1} + \frac{1}{x}$
8. $\frac{2}{x+1} + \frac{3}{(x+1)^2}$
9. $\frac{-7}{x-5} + \frac{-2}{(x-5)^2}$
10. $\frac{3}{x-4} + \frac{7}{(x-4)^2} + \frac{2}{x}$
11. $\frac{4}{x} + \frac{3}{x^2+1}$
12. $\frac{2}{x+1} + \frac{x}{x^2-3}$
13. $\frac{1}{x-2} + \frac{2x+1}{x^2+2x+3}$
14. $\frac{4x}{x^2-5} + \frac{1}{(x^2-5)^2}$
15. $\frac{2}{x} + \frac{3}{x^2+4} + \frac{x-1}{(x^2+4)^2}$
16. (0, 1, 4)
17. No, the leading coefficient of the 2nd equation is not a 1.
18. Yes
19. (1, 3)
20. Hyperbola

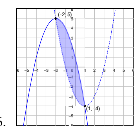
8-05

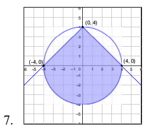
1. Consumer surplus is the amount consumers would pay above what they did pay. Producer surplus is the amount producers would accept below what they received.
2. 

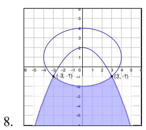
3. 

4. 

5. 

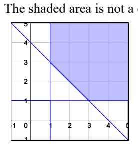
6. 

7. 

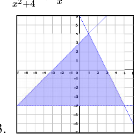
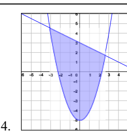
8. 

9. Consumer surplus: \$800; Producer surplus: \$800
10. Consumer surplus: \$486; Producer surplus: \$324
11. $\frac{A}{x} + \frac{Bx+C}{x^2-2}$
12. $\frac{1}{x} + \frac{2}{x+2}$
13. (1, 1, 5)
14. 67 guitars
15. $\left(\frac{2\sqrt{17}}{17}, \frac{4\sqrt{17}}{17}\right), \left(-\frac{2\sqrt{17}}{17}, -\frac{4\sqrt{17}}{17}\right)$

8-06

1. The shaded area is not a closed shape;

2. Max: 6 at (2, 2); Min: 2 at (0, 2)
3. Max: 1 at (0, 1); Min: −3 at (4, 1)
4. Max: 15 at (3, 4); Min: 7 at (1, 2)
5. Max: $\frac{17}{2}$ at (5, 6); Min: 0 at (0, 0)
6. Max: 21 at (9, 6); Min: 0 at (0, 0)
7. Max: 6 at (8, 6); Min: Does not exist
8. Max: Does not exist; Min: 4 anywhere from (1, 3) to (2, 2)
9. Purchase 12 of cabinet A and 6 of cabinet B
10. Produce 0 of bracket X and 20 of bracket Y (In real life, you might want to still make both brackets for so not to be tied to only one product. In that case producing 15 of bracket X and 12 of bracket Y makes almost the same profit.)
11. Graph each of the inequalities on the same coordinate plane. The solution is the intersection of the shaded areas.
12. $\frac{2}{x} + \frac{1}{x+1}$
13. $(a+2, -a+2, a)$
14. $\left(2\sqrt{2}, -2\sqrt{2}\right), \left(-2\sqrt{2}, 2\sqrt{2}\right)$
15. $x^2 + y^2 - 4x = 0$

8-Review

1. (−2, 4)
2. (4, 2)
3. (1, 3), (4, 0)
4. (−6, 3), (6, −3)
5. (3, 5)
6. $\left(\frac{1}{3}, \frac{1}{6}\right)$
7. (−3, 2, 4)
8. No solution
9. $\left(\frac{1}{7}a + \frac{5}{7}, \frac{9}{7}a + \frac{3}{7}, a\right)$
10. $\frac{3}{x+1} + \frac{-2}{x-2}$
11. $\frac{3}{x+6} + \frac{2}{(x+6)^2}$
12. $\frac{2x+1}{x^2+4} + \frac{3}{x}$
13. 
14. 
15. Min: 0 at (0, 0); Max: 24 at (3, 7)
16. Taco: \$1.29, Burrito: \$0.99