

## Math 150 Week-in-Review 2 Problem Set

(Parts of problems 5, 6, and 9 were taken from *Precalculus: Functions and Graphs* by Swokowski/Cole)

1. Kristina and Matt are putting together a puzzle. It would take Matt 5 hours more than Kristina to put the puzzle together by himself. Together, they can put the puzzle together in 6 hours. How long does it take Kristina to put it together by herself?
2. I have a 20 ounce bottle of lemonade that is 60% real lemon juice. How much water should I add to the bottle to reduce the concentration of real lemon juice to 50%?
3. A farmer plans to fence off a large rectangular lot and then further fence off 4 pens of equal size inside the lot. If the area of the lot is  $96 \text{ ft}^2$  and the farmer uses 60 ft of fencing, find the dimensions of the lot.
4. Two cars leave a parking lot at the same time. One heads due west and the other heads due south. The car heading west is going 2 mph faster than the car heading south. After 1.5 hours they will be 15 miles apart. How fast is the car heading south going?
5. Solve the following inequalities:
  - (a)  $4 < \frac{7-x}{2} \leq 9$
  - (b)  $2|-11 - 7x| - 2 > 10$
  - (c)  $|5x - 2| \leq 8$
  - (d)  $\frac{x-2}{3x+5} < 4$
  - (e)  $\frac{x}{2x-1} \geq \frac{3}{x+2}$
6. The braking distance  $d$  (in feet) of a certain car traveling  $v$  mi/hr is given by the equation  $d = v + \frac{v^2}{20}$ . Determine the speeds that result in breaking distances of less than 75 feet.
7. Shade the region in the Cartesian plane given by the set  $\{(x, y) \mid -3 < x \leq 4, |y| > 2\}$
8. Find the distance between the points  $(-5, 2)$  and  $(6, 1)$  and then find the midpoint of the line segment between these two points.
9. Verify that a triangle with the following vertices is a right triangle and find its area:  $A(8, 5)$ ,  $B(1, -2)$ , and  $C(-3, 2)$ .
10. Find the  $x$  and  $y$ -intercepts of the following graphs and test for symmetry.
  - (a)  $x - 1 = y^2$
  - (b)  $x^3 + y = 8$
  - (c)  $y = |3x| - 4$
  - (d)  $x = y^5 - 4y^3$
11. Find the equation of the circle that:
  - (a) has center  $(5, -6)$  and radius 12.
  - (b) has a diameter with endpoints  $(5, -2)$  and  $(7, 6)$ .

12. Find the center and radius for each of the following circles:

(a)  $(x - 2)^2 + y^2 = 36$

(b)  $x^2 + y^2 + 12y = 28$

(c)  $2x^2 + 2y^2 - 6x + 5y = 1$

13. Find the equation of the line that

(a) passes through the  $y$ -intercept of the line  $-2x + 3y = 9$  and is parallel to the line  $7x - 4y = 6$ .

(b) passes through the  $x$ -intercept of the line  $3x - 8y = 12$  and is perpendicular to the line  $x = 3$ .

14. Find an equation of the perpendicular bisector of the line segment joining the points  $(-1, 2)$  and  $(4, 3)$ .

15. Suppose that the relationship between the cost of utilities and the average temperature in a month is linear. If the average temperature in a month is  $96^\circ$ , your utilities bill is \$100. If the average temperature in a month is  $81^\circ$ , your utilities bill is \$75.

(a) Find an equation that expresses the cost of your utilities,  $C$ , in terms of the average temperature,  $T$ , in any given month.

(b) How much will your utilities bill increase if the average temperature in the current month is  $6^\circ$  higher than the average temperature last month?

(c) If you pay \$105 in utilities in August, what was the average temperature that month?