Algebra Review Name: _____
Math 1030, Instructor: Tim Carstens

Instructions: Math 1010 is a prerequisite for Math 1030. This means that you should have a working knowledge of intermediate algebra. This diagnostic test covers some of this background material. You should give yourself this test and then check your answers with the solution sheet provided in class. Mark any questions you are having a hard time with, as we'll be discussing questions in class to give everyone a chance to wake up their math skills.

Problem 1. *There are three kinds of apples all mixed up in a basket. How many apples must you draw (without looking) from the basket to be sure of getting two apples of one kind? Explain your answer.*

Problem 2. *There are 150 people in a class. If 80% of them are registered, how many are* not *registered?*

Problem 3. *Express "three-fifths" as a fraction, a decimal, and as a percentage.*

Problem 4. *Evaluate each of the following if* $a = 4$, $b = \frac{2}{5}$, *and* $c = -6$*:*

1. $a(b + c)$

2. $ab + c\frac{a}{b} - c$

3. $5b - 3c^2$

Problem 5. *Evaluate each of the following expressions on your calculator:*

1. $(250/(34 + 56)) \times 27$

2. $\frac{5}{7} + 6.3(4^5)$

3. $\sqrt{32} - \sqrt{15}$

Problem 6. *Simplify:*

1. $\frac{x^5 x^2}{x^{-3}}$

2. $(x^{-2}y^3)^2$

3. $(x^{-5}y^4)^2(x^0y^{-2})^2$

Problem 7. *If there are* 0.82 *US dollars in one Canadian dollar, which is smaller, one US dollar, or one Canadian dollar?*

Problem 8. *One number is* 6 *times a second number. Find the numbers if their difference is* 102.

Problem 9. *If you drive at an average speed of* 65 *miles per hour, how long will it take you to drive* 530 *miles? If you can bike a distance of* 45 *miles in three hours and* 15 *minutes, what is your average biking speed in miles per hour?*

Problem 10. *The length of a rectangle is* 14 *inches more than its width. If the area is* 72 *square inches, find the length and width of the rectangle.*

Problem 11. *Suppose that three-quarters of the freshmen live in a dorm. If two-thirds of the freshmen dorm residents are women, what percentage of the freshman class are women who live in the dorm?*

Problem 12. *Solve for x in the following equations:*

1. $3x - 5 = 9 + 7x$

2. $x^2 - 5 = 31$

3. $x^2 - x - 12 = 0$

4. $\frac{x-3}{5} = \frac{x}{2}$

5. $|x + 3| = 10$

Problem 13. *Solve for x and y, given the system*

$$3x - 2y = 5,\ x + y = 7.$$

Problem 14. *Graph the line* $5x - 2y = 6$. *What is the y-intercept?*

Problem 15. *A warehouse may contain bicycles, tricycles, and cars. Altogether there are 18 wheels in the warehouse. How many bicycles, tricycles, and cars are there? Give as many answers as possible.*

Problem 16. *The playground drawn below is the shape of a rectangle with a semicircle attached as shown. Suppose that the longer side of the rectangle is twice the length of the shorter side and that the radius of the semicircle is 12 feet. What is the perimeter and the area of the playground?*

Problem 17. *Suppose that the ratio of the undergraduate students to graduate students in an institution is 18:7. What percentage of the student body are graduate students?*

Problem 18. *Suppose that your annual tuition as a freshman was \$1856. Each year tuition has increased 5%. Now you are in your senior year. What is your annual tuition this year?*

Problem 19. *The company you work for was doing poorly two years ago and as a result everyone took a 10% cut in pay for the last year. The company is doing better now and the CEO has just promised to raise everyone's salary 10% for next year. Does this mean that your salary next year will be the same as it was two years ago? Explain.*

Problem 20. *Determine any errors made in the work shown below. Then explain the mistake.*

1. Solving for x:

$$\begin{aligned} \frac{3(-5)+x(3)}{3} &= 1 \text{ “cancel 3”} \\ -5+3x &= 1 \text{ “add +5 to both sides”} \\ 3x &= 5 \text{ “ subtract 3 from both sides”} \\ x &= 3 \end{aligned}$$

2. Solving for x:

$$\begin{aligned} 2\left(\frac{x+3}{5}\right) &= x \text{ “add -3 to both sides”} \\ \frac{2(x)}{5} &= x+-3 \text{ “multiply by 5”} \\ 2x &= 5x-15 \text{ “subtract 2”} \\ x &= 5x-15 \text{ “subtract } 5x\text{”} \\ -4x &= -17 \text{ “subtract -4”} \\ x &= -21 \end{aligned}$$

3. Simplify: $5(x^2y^3) = 5x^2\,5y^3 = 25x^2y^3$.