College Algebra **TEST 1** **Solution** **Fall 2013**

NAME: _____Score_____/100

Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION Course Average_____

No Decimals No mixed numbers No complex fractions No boxed or circled answers

Questions 1 – 30 are 1 pt each

1. T F A formula must be an equation.
2. T F Definitions in mathematics are stipulative.
3. T F A binary operation is a comparison of two operands.
4. T F Two equations are equivalent if they have the same solution sets.
5. T F A real number which is not an integer is irrational.
6. T F The solution set of $|3x - 5| < 8$ can be written using interval notation.
7. T F The interval $[-2, 0]$ contains irrational numbers.
8. T F The solution set for the equation $3x = 12$ is 4.
9. T F The set of Natural Numbers is a subset of the set of Rational Numbers.
10. T F $|3x - 5| = 0$ if and only if $3x - 5 = 0$.
11. T F If $3x + 5$ is added to both sides of an equation, the new equation is equivalent to the original equation.
12. T F To say 3 is a solution of an equation means the same as saying $\{3\}$ is the solution set for that equation.
13. T F An equation is a mathematical statement which contains an = symbol.
14. T F When both sides of an equation are multiplied by an expression containing a variable the resulting equation will be equivalent to the original.

15. A linear equation in one variable is an equation which can be written in the form $ax + b = 0$.

16. The set of Integers consists of the set of Whole numbers with their opposites adjoined.

17. A number that makes an equation true when substituted for the variable is a solution of the equation.

18. The graph of an equation in one variable is drawn on the real number line.

19. The graph of an equation consists of all the points, and only those points, whose coordinates are solutions of the equation.

20. A conditional inequality is an inequality which is true when some real numbers are substituted for the variables and is false when some real numbers are substituted for the variables.

21. Give an example of a unary operation. squaring

22. The solution set for a linear identity in one variable is **R**.

23. The solution set for $|5x + 6| > -4$ is **R.**

24. According to The Transitive Property, if two expressions represent the same quantity, then those two expressions are equal.

25. The process to solve a linear equation in one variable is to generate a sequence of equations each equivalent to the previous equation until a simplest equation is obtained.

26. Write the formula for the area of a triangle $A = \frac{1}{2}bh$.

27. Write the inequality $|5x - 2| < 1$ as a compact compound inequality. $-1 < 5x - 2 < 1$

28. The solution set for $|3x + 7| = -4$ is $\varnothing$.

29. Write the formula for the area of a circle $A = \pi r^2$.

30. Use interval notation to write the set $\{x \mid x < 5 \text{ and } x \geq 8\} = (-\infty, 5) \cap [8, \infty)$ .A better question would have been "Use interval notation to write the set $\{x \mid x < 5 \text{ or } x \geq 8\} = (-\infty, 5) \cup [8, \infty)$."

In the following multiple choice questions, any number of choices may be correct. In each question at least one choice is correct. Circle ALL correct choices.

For Questions 31 – 37 each part is worth one point

31. Which of the following are linear equations in one variable?
    a. $3x - 7 = 2x + 12$
    b. $\sqrt{7x} + 1 = 0$
    c. $x^2 = 3$
    d. $\frac{2x}{5} + \sqrt{3} = \frac{3}{\sqrt{2}}x$
    e. $\frac{x-3}{4} = \frac{2-3x}{x}$
    f. $\sqrt{8} = x$

32. The solution set of the inequality $\left|\frac{3x-4}{x+5}\right| < -9$ is:
    a. The empty set
    b. $\left\{x \mid 9 < \frac{3x-4}{x+5} < -9\right\}$
    c. $\{0\}$
    d. A set of irrational numbers.
    e. All real numbers $\mathbf{R}$

33. The graph of a conditional linear equation in one variable:
    a. Is on the number line
    b. Is in the Cartesian coordinate system
    c. Is a line
    d. Is a dot
    e. Is a collection of more than one dot
    f. Is an interval
    g. Is a ray

34. If the solution set for an equation is the empty set, then:
    a. The equation is an identity
    b. The equation is a conditional equation
    c. The equation is a contradiction
    d. The equation has no solution
    e. Every real number is a solution.

35. If both sides of an inequality are multiplied by a (the same) non-zero real number:
   a. The resulting inequality is equivalent to the original inequality.
   b. The two inequalities have the same solution sets.
   c. The two inequalities might have different solution sets.
   d. The two inequalities are equal.
   e. The resulting inequality is a simplest inequality.

36. Insert the correct symbol in the $\square$ to make the statement true.

You should choose from these symbols: $\in \quad \notin \quad \subset \quad \not\subset \quad = \quad \neq \quad < \quad >$

a. -6 $\in$ {x|x is an integer}

b. {-9} $\subset$ {x|x is an integer}

c. -4 $\notin$ {x|x is an irrational number}

d. $\sqrt{3}$ $\notin$ {x|x is a rational number}

37. Complete the statement of The Law of Trichotomy
If a and b are real numbers then exactly one of the following is true:

i. $a < b$

ii. $a = b$

iii. $a > b$

Problems 38 – 46 are each worth 4 points.

38. Complete The Transitive Property of equality.
If a, b, and c are real numbers such that $a = b$ and $b = c$, then $a = c$.

39. Write $|5x + 7| < 25$ as a compact compound inequality without absolute value.

$-25 < 5x + 7 < 25$

40. The graph of an equation in one variable is 

What is the solution set for that equation? {1, 3, 4, 9/2}

41. Solve the equation $3x + 4 = -x + \sqrt{2}$

$3x + 4 = -x + \sqrt{2}$

$4x + 4 = \sqrt{2}$

$4x = \sqrt{2} - 4$

$x = \dfrac{\sqrt{2} - 4}{4}$

The solution set is $\left\{\dfrac{\sqrt{2} - 4}{4}\right\}$

42. The graph of a particular absolute value inequality of the form $|ax + b| < k$ is 

a. Use interval notation to write the solution set for $|ax + b| > k$

$(-\infty, 3) \cup (7, \infty)$

b. Use the roster method to write the solution set for $|ax + b| = k$ $\{3, 7\}$

43. The solution sets for the three statements $|ax + b| < k$, $|ax + b| = k$, $|ax + b| > k$, are shown in red, green and blue.

a) The solution set for $|ax + b| > k$ is shown in red.

b) The solution set for $|ax + b| = k$ is shown in green.

c) The solution set for $|ax + b| > k$ is shown in blue.

44. Find the solution set for the inequality $|2x + 8| > 4$? Show the steps of your solution process. Write the solution set in interval notation. **Use the process discussed in class. Words are an important part of your work. A graph would also help.**

Begin by solving the easy one $|2x + 8| < 4$ which is equivalent to

$-4 < 2x + 8 < 4$

$-12 < 2x < -4$

$-6 < x < -2$

The solution set for $|2x + 8| < 4$ is the interval $(-6, -2)$

Therefore the desired solution set for $|2x + 8| > 4$ is

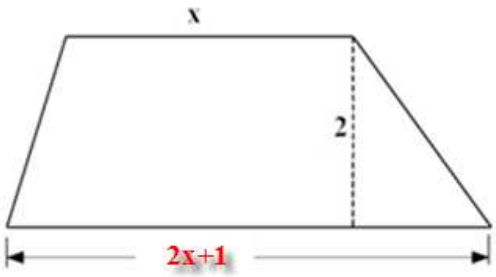
$(-\infty, -6) \cup (-2, +\infty)$

45. Complete the following **algebraic** definition of absolute value.

The absolute value of a real number x or an expression x which represents a real number is defined by

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

46. Complete this analysis by supplying the missing information.



Problem:

The length of one of the bases of a trapezoid is one more than twice that of the other base. The altitude is 2 in. If the area of the trapezoid is 19, what are the lengths of its bases?

Analysis:

Let x be the length of the shortest base.

Then the length of the longer base is 2x + 1.

(at this time supply the missing dimension on the diagram)

The area of the trapezoid is A = 19.

Using the formula $A = \frac{1}{2}(B + b)h$ for the area of a trapezoid we obtain

$$A = \frac{1}{2}(x + (2x + 1))(2) = 3x + 1$$

We now have two expressions for the area of the trapezoid.

Therefore (by the Transitive Property) the two expressions must be equal.

This observation yields the model 3x +1 = 19

Solving this equation will produce the desired length.

[redacted]

x = 6

The short base of the trapezoid is 6 inches long

The long base of the trapezoid is 13 inches