

College Algebra TEST 1 Chapter 1 Summer 2005

NAME: _____ Score _____ /100

Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

Circle T or F, whichever is correct. (1 point each)

1. **T** F $y = mx + b$ is the equation of a line.
2. **T** F If the slope of one line is $\frac{1}{3}$ and the slope of another line is -3 , the lines are perpendicular
3. **T** F If an expression is added to both sides of an inequality, the result is an inequality which is equivalent to the first inequality.
4. T **F** If both sides of an inequality are multiplied by the same non-zero real number, the result is an inequality which is equivalent to the original inequality.
5. T **F** The quadratic formula is $y = ax^2 + bx + c$
6. T **F** $3x = 8$ is a simplest equation
7. T **F** The equations $x + 1 = 4$ and $x^2 + x = 4x$ are equivalent equations
8. **T** F A solution of a linear inequality is a number which makes the inequality a true statement when substituted for the variable.
9. **T** F If two equations have the same solution set they are equivalent equations
10. **T** F If an expression is added to both sides of an equation, the result is an equation which is equivalent to the first equation.
11. **T** F If both sides of an equation are multiplied by the same non-zero real number, the result is an equation which is equivalent to the original equation.
12. **T** F Every division problem is done by changing it to a multiplication problem.
13. T **F** If $a + bi$ and $c + di$ are two complex numbers then their sum is $ac + bdi$
14. T **F** if $a + bi$ is a complex number, then its conjugate is $-a - bi$
15. T **F** The product of a complex number and its conjugate is 1

Fill in each of the blanks to make the statements true. (1 point each)

16. An **equation** is a mathematical statement which contains an = sign.
17. A number (or numbers) that makes an equation true when substituted for the variable (or variables) is called a **solution** of the equation.
18. Two equations are **equivalent** if they have the same solution sets

19. A simplest equation is an equation which has a single **variable** on one side of the equal sign and a single **number** on the other side
20. A linear equation in one variable is an equation that can be written in the form $ax + b = 0$ where a and b are real numbers with a not zero.
21. A quadratic equation in one variable x is an equation which may be written in the form $ax^2 + bx + c = 0$ where a, b, and c are real numbers and a is not zero.
22. A number (or numbers) that makes an inequality true when substituted for the variable (or variables) is called a **solution** of the inequality.
23. Two inequalities are **equivalent** inequalities if they have the same solution sets
24. A linear inequality in one variable x is an inequality which can be written in the form $ax + b < 0$.
25. The **graph** of an inequality consists of all the points, and only those points, which are solutions of the inequality
26. If the same **expression** is added to (or subtracted from) both sides of an inequality the resulting inequality will be equivalent to the original inequality.
27. The equation $x^2 + y^2 = r^2$ is the equation of the **circle** with **center** at the origin and **radius** r
28. Two equations are **equivalent** if they have the same solutions.
29. The definition of **Absolute Value** is: $|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

30. Complete this statement of the Quadratic Formula.

The solutions of a quadratic equation $ax^2 + bx + c = 0$
(where a,b, and c are Real numbers and a is not 0)

are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(Show your work on the following exercises – 5 points each) No Work – No Credit

31. $(-2 + 7i) + (-5 + 4i) = (-2 - 5) + (7 + 4)i = -7 + 11i$

32. Compute the product $(3 - 7i)(3 + 4i) = 9 + 12i - 21i - 28i^2 = 9 - 9i + 28 = 37 - 9i$

33. Write the complex conjugate of $7 - 4i$ **The complex conjugate of $7 - 4i$ is $7 + 4i$**

34. Compute the multiplicative inverse of $3 - 2i$.

The multiplicative inverse of $3 - 2i$ is its conjugate $3 + 2i$ divided by its norm $3^2 + 2^2 = 13$.

Therefore its multiplicative inverse is $\frac{3 + 2i}{13} = \frac{3}{13} + \frac{2}{13}i$

35. Solve the equation $x^3 - 3x^2 - x + 3 = 0$

$x^2(x-3) - (x-3) = 0$ $(x-3)(x^2-1) = 0$ $(x-3)(x-1)(x+1) = 0$ <p>By the Zero Factor Property</p> $x-3=0 \text{ OR } x-1=0 \text{ OR } x+1=0$ $x=3 \text{ OR } x=1 \text{ OR } x=-1$ <p>Therefore the solutions set is $\{-1, 1, 3\}$</p>	$x^2(x-3) - (x-3) = 0$ $(x-3)(x^2-1) = 0$ <p>By the Zero Factor Property</p> $x-3=0 \text{ OR } x^2-1=0$ $x=3 \text{ OR } x^2=1$ $x=3 \text{ OR } x=\pm\sqrt{1}=\pm 1$ <p>Therefore the solutions set is $\{-1, 1, 3\}$</p>
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36. Find the solution set for $2x - 7 = 6x + 5$

$$2x - 7 = 6x + 5$$

$$-4x = 12$$

$$x = -3$$

37. Find the solution set for $(x-1)(x-3) = 24$

$x^2 - 4x + 3 = 24$ $x^2 - 4x - 21 = 0$ $(x-7)(x+3) = 0$ $x-7=0 \text{ OR } x+3=0$ $x=7 \text{ OR } x=-3$ <p>The solution set is $\{7, -3\}$</p>	$x^2 - 4x + 3 = 24$ $x^2 - 4x - 21 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{4 \pm \sqrt{16 - (4)(1)(-21)}}{2}$ $= \frac{4 \pm \sqrt{100}}{2} = \frac{4 \pm 10}{2} = 2 \pm 5$ <p>The solution set is $\{7, -3\}$</p>
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38. Find the solution set for $\sqrt{x+3} = 7$

Square both sides of the equation to obtain $x+3 = 49$. Clearly $x = 46$.

Test 46: $\sqrt{46+3} = 7$ is true. Therefore 46 is the solution.

39. Find the solution set for $2x^2 + x - 1 = 0$

$(2x-1)(x+1) = 0$ $2x-1=0 \text{ OR } x+1=0$ $x = \frac{1}{2} \text{ OR } x = -1$ <p>The solution set is $\left\{\frac{1}{2}, -1\right\}$</p>	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-1 \pm \sqrt{1 - (4)(2)(-1)}}{(2)(2)}$ $= \frac{-1 \pm \sqrt{9}}{4} = \frac{-1 \pm 3}{4} = \frac{1}{2} \text{ OR } -1$ <p>The solution set is $\left\{\frac{1}{2}, -1\right\}$</p>
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40. Find the solution set for $|2x + 3| = 5$

$|2x + 3| = 5$ is equivalent to the two equations

$$2x + 3 = 5 \quad \text{OR} \quad 2x + 3 = -5$$

$$2x = 2 \quad \text{OR} \quad 2x = -8$$

$$x = 1 \quad \text{OR} \quad x = -4$$

The solution set is $\{1, -4\}$

41. Find the equation of the circle with center (2, 3) and radius 6.

$$(x - 2)^2 + (y - 3)^2 = 36$$

42. Find the solution set for $|4 - 5x| < 11$

$$-11 < 4 - 5x < 11$$

$$-15 < -5x < 7$$

$$3 > x > -\frac{7}{5}$$

The solution set is $\left\{x \mid -\frac{7}{5} < x < 3\right\}$ or in interval notation the solution set is $\left(-\frac{7}{5}, 3\right)$

43. Write the set $\{x \mid -3 < x < 7\}$ in interval notation. $(-3, 7)$

44. Solve the equation $F = \frac{9}{5}C + 32$ for C

$$F - 32 = \frac{9}{5}C$$

$$\frac{5}{9}(F - 32) = C$$