Meramec College Algebra TEST 2 Summer 2009

NAME: ______________________________ Score______________________________/100

Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

2 pts. each for 1 – 25. 10 points for #39. 5 pts. each for all others.

If you intend to use a formula, state the formula and then use it. No decimals or mixed numbers!!

Circle T or F, whichever is correct.

1. T **F** $|3x – 7| < 8$ is equivalent to $3x – 7 < 8$.

2. T **F** A zero of a function is a range element.

3. T **F** Every zero of a function is an x-intercept of the graph of the function.

4. **T** F The y-intercept of the graph of a function f is f(0).

5. T **F** If both sides of the equation $x = \sqrt{-5x - 6}$ are squared to obtain the equation $x^2 = –5x – 6$, the two equations are equivalent.

6. **T** F The graph of $|4x + 7| < 9$ is an interval on the number line.

7. T **F** The slope of a vertical line is 0.

8. **T** F The slope of a horizontal line is 0.

9. **T** F If the discriminant of a quadratic function is 0, the graph of the function has one x-intercept.

10. **T** F The graph of a quadratic equation in two variables is a parabola which opens up if $a > 0$ and opens down if $a < 0$.

Fill in each of the blanks to make the statements true.

11. If the point (4, 9) is on the graph of a function f, then 4 is a **domain** element.

12. If the point (4, 9) is on the graph of a function f, then 9 is a **range** element.

13. If the point (4, 9) is on the graph of a function f, then f(4) = **9**.

14. A linear function is a function whose rule may be written in the form **$f(x) = mx + b$**.

15. A quadratic function is a function whose rule may be written in the form **$f(x) = ax^2 + bx + c$**.

16. The squaring function is a function whose rule is **$f(x) = x^2$**.

17. To find the zeros of a function f we must find the real solution of the equation resulting from **$f(x) = 0$**.

18. The y-intercept of the function whose rule is $f(x) = 5x^3 – 4x^2 + 2x + 9$ is **(0, 9)**.

19. The x-intercepts of the function f whose rule is $f(x) = (x + 3)(x + 5)(2x – 5)$ are **(-3, 0), (-5, 0), $\left(\frac{5}{2}, 0\right)$**.

20. The discriminant of $y = 2x^2 - 3x + 4$ is **$b^2 - 4ac = (-3)^2 - (4)(2)(4) = 9 - 32 = -23$**.

21. The rule for the vertex of the graph of the quadratic function f is $\left(\frac{-b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

22. The graph of a linear equation in two variables is a **non vertical line**.

23. The graph of a linear inequality in two variables is a **half** plane.

24. The equation $y = 5x + 7$ is the boundary equation for the two inequalities **$y < 5x + 7$** and **$y > 5x + 7$**.

25. The inequality $|2x + 7| < 3$ is equivalent to the following compound inequality **$-3 < 2x + 7 < 3$**.

26. Solve the inequality $|2x + 7| < 3$. Write the solution set in interval notation.

$-3 < 2x + 7 < 3$
$-10 < 2x < -4$
$-5 < x < -2$
The solution set is the interval $\{x \mid -5 < x < -2\} = (-5, -2)$

27. Suppose f and g are functions whose rules are $f(x) = 3x + 2$ and $g(x) = \frac{2x}{x+5}$. Find the rule for $f \circ g$.

$$f \circ g(x) = f(g(x)) = f\left(\frac{2x}{x+5}\right) = 3\left(\frac{2x}{x+5}\right) + 2 = \frac{6x}{x+5} + 2 = \frac{6x}{x+5} + \frac{2x+10}{x+5} = \frac{8x+10}{x+5}$$

28. Suppose the rule for a function f is $f(x) = \frac{2x-1}{3x^2}$.

Calculate the range element associated with 3. Use proper notation. No decimals or mixed numbers.

$$f(3) = \frac{2(3)-1}{3(3^2)} = \frac{6-1}{27} = \frac{5}{27}$$

29. What is the domain of the function whose rule is $f(x) = \frac{3x-2}{x+5}$?

The domain of f is all real numbers for which the rule makes sense. So the domain of f is the set of real numbers except those which cause the denominator to be zero. **Therefore the domain of f is all real numbers except -5. $\{x \mid x \neq -5\}$**

30. Show that the point $\left(2,\ \frac{4}{7}\right)$ is on the graph of the function whose rule is $f(x) = \frac{3x-2}{x+5}$. Use proper notation.

$f(2) = \frac{3(2)-2}{2+5} = \frac{6-2}{7} = \frac{4}{7}$. **Therefore the point is on the graph of f.**

31. Label the quadrants in Fig. 2.

32. Plot the point (– 3, 2) on Fig. 2.

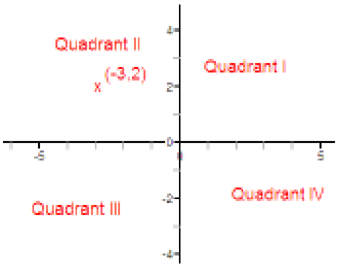


Fig. 2

33. Find the midpoint of the line segment joining (6, –2) and (–1, 3). No decimals or mixed numbers.

midpoint is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{6-1}{2}, \frac{3-2}{2}\right) = \left(\frac{2}{2}, \frac{1}{2}\right)$

34. Find the length of the line segment joining (6, –2) and (–1, 3). No decimals or mixed numbers.

$d = \sqrt{(x_1-x_2)^2+(y_1-y_2)^2} = \sqrt{(6+1)^2+(3+2)^2} = \sqrt{(7)^2+(5)^2} = \sqrt{49+25} = \sqrt{74}$

35. Find the slope of the line segment joining (6, –2) and (–1, 3). No decimals or mixed numbers.

$m = \frac{y_1-y_2}{x_1-x_2} = \frac{3-(-2)}{-1-6} = \frac{5}{-7} = -\frac{5}{7}$

36. Find the equation of the line through (6, –2) and (–1, 3). No decimals or mixed numbers.

Use m = $-\frac{5}{7}$ and the point slope form

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -\frac{5}{7}(x+1)$$

$$y - 3 = -\frac{5}{7}x - \frac{5}{7}$$

$$y = -\frac{5}{7}x - \frac{5}{7} + 3 = -\frac{5}{7}x - \frac{5}{7} + \frac{21}{7}$$

$$y = -\frac{5}{7}x + \frac{16}{7}$$

37. The graph of absolute value inequality $|ax + b| < c$ is shown in Fig. 1.

(a) (2 pts.) Use the roster method to write the solution set for the equation $|ax + b| = c$.

{-7, 5}

(b) (3 pts.) On Fig. 1, shade the solution set for $|ax + b| > c$.

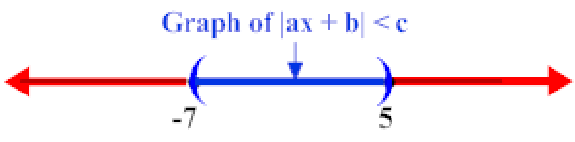
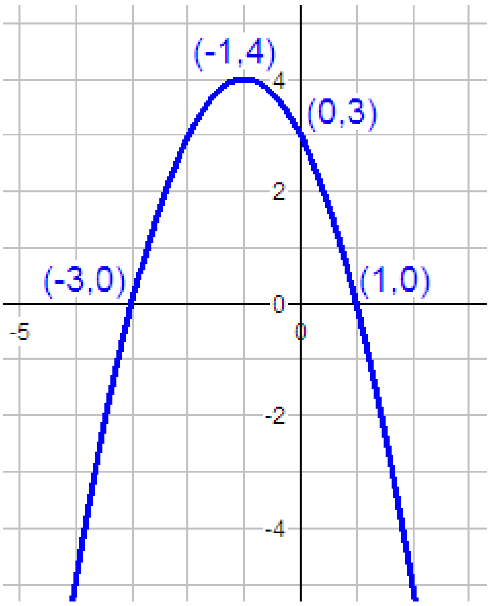


Fig. 1

38. Consider the following facts about a function named f.

a) f is a quadratic function.
b) The leading coefficient is negative.
c) f(0) = 3
d) f has two zeros – 3 and 1
e) The vertex is (–1,4)

Sketch the graph of f. Label all important points.



39. (6 pts) A **function** consists of three things;

- A set called the **domain**
- A set called the **range**
- A **rule** which associates **each** element of the **domain** with a **unique** element of the range.

(4 pts)