Meramec Intermediate Algebra TEST 5 Solution Spring 2009

NAME: _____Score_____/100
Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

2 points each for questions 1 – 20. Point value for others as indicated.
Circle T or F, whichever is correct.

1. T **F** The graph of a quadratic equation in one variable is a line.
2. T **F** The graph of a quadratic equation in two variables is a line.
3. **T** F To factor means to write as a product.
4. T **F** $\frac{2}{3}+\frac{3}{4}=\frac{5}{7}$.
5. **T** F The x-intercepts of the graph of an equation in two variables is found by solving the corresponding equation in one variable.
6. T **F** The Zero Factor Property applies only to solving quadratic equations.
7. T **F** Every quadratic equation in one variable may be solved with factoring and The Zero Factor Property.
8. **T** F Every quadratic equation in one variable may be solved with the Quadratic Formula.
9. T **F** $(x + y)^2 = x^2 + y^2$
10. T **F** $x^2 – y^2 = (x – y)(x – y)$

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

11. Factor $x^2 – 49$ **$= (x – 7)(x + 7)$**

12. Factor $x^2 + 6x + 9$ **$= (x + 3)^2$**

13. Factor $x^2 – 10x + 25$ **$= (x – 5)^2$**

14. To find the x-intercepts of the graph of $y = x^2 + 7x – 3$ we must solve the equation **$0 = x^2 + 7x – 3$**.

15. If the discriminant $b^2 – 4ac > 0$, the graph of the corresponding parabola has **two** x-intercepts.

16. When $7x^3 + 16x^2 + 2x – 1$ is divided by $x + 4$ the quotient is $7x^2 – 12x + 50$ and the remainder is $– 201$. Therefore $7x^3 + 16x^2 + 2x – 1 =$ **$(x + 4)(7x^2 – 12x + 50) + (–201)$**.

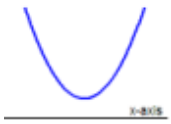
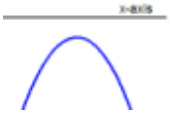
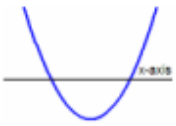
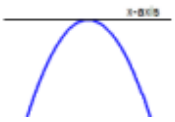
17. The graph of $y = 5x^2 – 6x – 9$ is a **parabola** which opens **up**.

18. The graph of $(x – 2)(x – 3) = 0$ is/are the **x-intercepts** of the graph of $y = (x – 2)(x – 3)$.

19. If the leading coefficient of a quadratic equation in two variables is negative and its discriminant is also negative, then the graph has **no** x-intercepts.

20. In order to attempt to factor $3(3x – 7)^2 – 5(3x – 7) + 8$ one might try the substitution M = **$3x – 7$**.

For questions 21 through 25, consider the following list

a 	**b** 	**c** 
d 	**e** 	**f** 

21. (3 pts)Which items in the above list have positive leading coefficients?
    Circle the correct response. a **b** c **d** e **f**
22. (3 pts)Which items in the above list have negative leading coefficients?
    Circle the correct response. **a** b **c** d **e** f
23. (3 pts)Which items in the above list have positive discriminant?
    Circle the correct response. **a** b c **d** e f
24. (3 pts)Which items in the above list have negative discriminant?
    Circle the correct response. a **b** **c** d e f
25. (3 pts)Which items in the above list are graphs of a quadratic equation in two variables?
    Circle the correct response. **a** **b** **c** **d** **e** **f**

26. (5 pts).

a) Complete the rule/definition of addition for rational expressions $\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$.

b) Complete the rule/definition for multiplication of rational expressions $\left(\frac{a}{b}\right)\left(\frac{c}{d}\right)=\frac{ac}{bd}$.

c) Complete the rule/definition for division of rational expressions $\left(\frac{a}{b}\right)\div\left(\frac{c}{d}\right)=\left(\frac{a}{b}\right)\left(\frac{d}{c}\right)=\frac{ad}{bc}$.

d) Complete the rule/definition for subtraction of rational expressions $\left(\frac{a}{b}\right)-\left(\frac{c}{d}\right)=\left(\frac{a}{b}\right)+\left(\frac{-c}{d}\right)$.

e) Expand the fraction $\frac{5}{8}$ to a fraction with a NUMERATOR of 15 to obtain $\frac{5}{8}=\frac{15}{24}$

27. (3 *pts*) Simplify completely $\frac{x^2-25}{x+5}=\frac{\cancel{(x+5)}(x-5)}{\cancel{(x+5)}}=x-5$

28. (3 pts) Find the solution set of the equation (3x – 2)(x + 5) = 0.
    By the Zero Factor Property
    3x – 2 = 0 OR x + 5 = 0
    $x=\frac{2}{3}$ OR $x=-5$
    The solution set is $\left\{\frac{2}{3},-5\right\}$

29. (3 pts) Find the solution set of the equation $2x^2 + 9x - 5 = 0$

$(2x - 1)(x + 5) = 0$

By the Zero Factor Property

$2x - 1 = 0$ OR $x + 5 = 0$

$x = \frac{1}{2}$ or $x = -5$

The solution set is $\left\{\frac{1}{2}, -5\right\}$

30. (5 pts) Use the quadratic formula to solve the equation $3x^2 - 8x - 2 = 0$.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{8 \pm \sqrt{(-8)^2 - 4(3)(-2)}}{2(3)} = \frac{8 \pm \sqrt{64 + 24}}{6} = \frac{8 \pm \sqrt{88}}{6}$$

$$= \frac{8 \pm \sqrt{(4)(22)}}{6} = \frac{8 \pm 2\sqrt{22}}{6} = \frac{2\left(4 \pm \sqrt{22}\right)}{(2)(3)} = \left(\frac{2}{2}\right)\left(\frac{4 \pm \sqrt{22}}{3}\right) = \frac{4 \pm \sqrt{22}}{3}$$

31. (3 pts) Compute the product (do not simplify).

$$\left(\frac{3x+2}{x-1}\right)\left(\frac{x-2}{x+1}\right) = \frac{(3x+2)(x-2)}{(x-1)(x+1)} = \frac{3x^2 - 6x + 2x - 4}{x^2 - 1} = \frac{3x^2 - 4x - 4}{x^2 - 1}$$

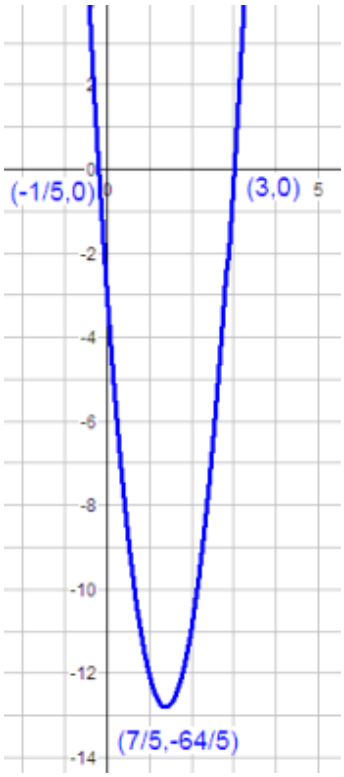
32. (3 pts) Compute the quotient (do not simplify).

$$\left(\frac{3x+2}{x-1}\right) \div \left(\frac{x-2}{x+1}\right) = \left(\frac{3x+2}{x-1}\right)\left(\frac{x+1}{x-2}\right) = \frac{(3x+2)(x+1)}{(x-1)(x-2)} = \frac{3x^2 + 3x + 2x + 2}{x^2 - 2x - x + 2} = \frac{3x^2 + 5x + 2}{x^2 - 3x + 2}$$

33. (5 pts) Answer the following questions about the equation $y = 5x^2 - 14x - 3$.

a. What is the shape of the graph?

It is a parabola which opens up.



b. What are its x-intercepts? To find the x-intercepts, we must solve the equation $0 = 5x^2 - 14x - 3$ which we can do with factoring and the Zero Factor Property

$0 = 5x^2 - 14x - 3$

$0 = (5x + 1)(x - 3)$

$5x + 1 = 0$ OR $x - 3 = 0$

$x = -\frac{1}{5}$ OR $x = 3$ The x-intercepts are $\left(-\frac{1}{5}, 0\right)$ and $(3, 0)$

c. What is its vertex?

The first coordinate of the vertex is $\frac{-b}{2a} = \frac{14}{10} = \frac{7}{5}$.

The second coordinate is found by substituting $\frac{7}{5}$ into the original equation $y = 5x^2 - 14x - 3 = [5x + 1][x - 3]$

$$y = \left[5\left(\frac{7}{5}\right) + 1\right]\left[\frac{7}{5} - 3\right] = [7 + 1]\left[\frac{7}{5} - \frac{15}{5}\right] = [8]\left[\frac{-8}{5}\right] = \frac{-64}{5}$$

The vertex is $\left(\frac{7}{5}, \frac{-64}{5}\right)$

d. Sketch the graph

34. (3 pts) Perform the indicated addition (do not simplify).

$$\frac{5x+2}{x^2+2x-8}+\frac{2-4x}{x^2+2x-8}=\frac{(5x+2)+(2-4x)}{x^2+2x-8}=\frac{x+4}{x^2+2x-8}$$

35. (3 pts) Perform the indicated addition (simplify completely).

$$\frac{x-1}{x-5}+\frac{x+2}{x+5}=\frac{(x-1)(x+5)}{(x-5)(x+5)}+\frac{(x+2)(x-5)}{(X-5)(X+5)}=\frac{x^2+4x-5}{(x-5)(x+5)}+\frac{x^2-3x-10}{(X-5)(X+5)}$$

$$=\frac{(x^2+4x-5)(x^2-3x-10)}{(x-5)(x+5)}=\frac{2x^2+x-15}{(x-5)(x+5)}=\frac{(2x-5)(x+3)}{(x-5)(x+5)}$$

36. (3 pts)Perform the indicated subtraction (simplify completely). $\frac{x+4}{4x}-\frac{x-4}{4x}=\frac{(x+4)+(4-x)}{4x}=\frac{8}{4x}=\frac{2}{x}$

37. (3 pts) Do the indicated division (simplify completely). $\frac{\frac{15}{2x}}{\frac{5}{6x}}=\left(\frac{15}{2x}\right)\left(\frac{6x}{5}\right)=\left(\frac{\cancel{5}}{\cancel{5}}\right)\left(\frac{\cancel{2x}}{\cancel{2x}}\right)\left(\frac{(3)(3)}{1}\right)=9$

38. (3 pts) What has been your favorite topic in this course?