

Math 100
Final Exam

Name Key
Section _____ Date _____ Score _____

Show all work for full credit!

1. Evaluate, when $a=3$, $b=4$, and $c=-2$.

$$\frac{c - (a - b^2) + 2a}{b + ac} = \frac{-2 - (3 - 4^2) + 2(3)}{4 + 3(-2)}$$

$$= \frac{-2 - (3 - 16) + 6}{4 - 6}$$

$$= \frac{-2 + 13 + 6}{4 - 6} = \frac{17}{-2}$$

$$-\frac{17}{2}$$

3 points

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

$$6x - 4 + 12 = 5x - 3$$

$$\frac{6x + 8}{-5x - 8} = \frac{5x - 3}{-x - 8}$$

$$x = -11$$

$$\{-11\}$$

3 points

3. Solve for C. $x = \frac{C-R}{y}$

$$xy = C - R$$

$$C = xy + R$$

$$C = xy + R$$

2 points

4. Solve: $2(2x+1) - 4(x-2) = 6 + 2x$

$$4x + 2 - 4x + 8 = 6 + 2x$$

$$10 = 6 + 2x$$

$$4 = 2x$$

$$\underline{2 = x}$$

$$\{2\}$$

2 points

5. Solve the inequality. Graph and give the solution set in **interval notation**.

$$-\frac{2}{3} < \frac{x+2}{3} \leq 4 \quad \text{1 point}$$

$$-2 < x+2 \leq 12$$

$$\underline{-2} \quad \underline{-2} \quad \underline{-2}$$

$$-4 < x \leq 10$$



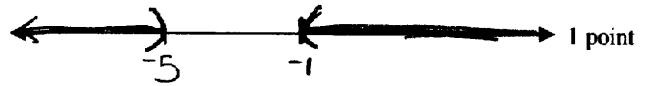
$$[-4, 10]$$

1 point

6. Solve the compound inequality. Graph and give the solution set in **interval notation**.

$$3x > -3 \text{ or } 2 - x > 7 \quad \text{2 points}$$

$$x > -1 \text{ or } -x > 5 \\ x < -5$$



$$(-\infty, -5) \cup (-1, \infty)$$

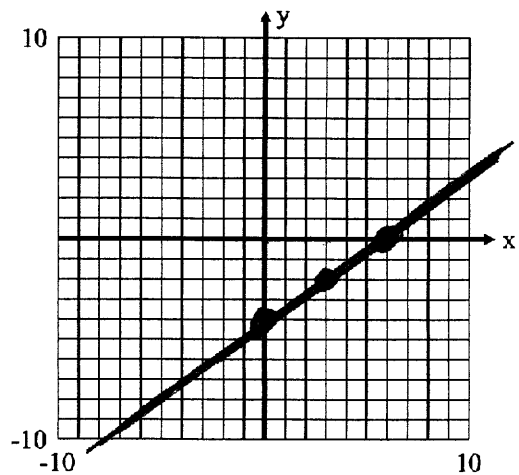
1 point

7. Complete the table of ordered pairs for the equation $2x - 3y = 12$; then graph the equation.

$$2x + 6 = 12 \\ 2x = 6 \\ x = 3$$

3 points

x	y
0	-4
6	0
3	-2



8. Find an equation of the line passing through the points (4, 1) and (-4, -5). Write your answer in **slope-intercept form**.

$$m = \frac{-5 - 1}{-4 - 4} = \frac{-6}{-8} = \frac{3}{4}$$

$$y - 1 = \frac{3}{4}(x - 4)$$

$$y - 1 = \frac{3}{4}x - 3$$

$$y = \frac{3}{4}x - 2$$

or

$$y = mx + b$$

$$1 = \frac{3}{4}(4) + b$$

$$1 = 3 + b$$

$$-2 = b \quad \therefore y = \frac{3}{4}x - 2$$

$$y = \frac{3}{4}x - 2$$

3 points

9. Determine whether the lines $x + 2y = 7$ and $x - 2y = 7$ are **parallel, perpendicular, or neither**.

$$2y = -x + 7$$

$$y = -\frac{x}{2} + \frac{7}{2}$$

$$m = -\frac{1}{2}$$

$$\text{and } -2y = -x + 7$$

$$y = \frac{x}{2} - \frac{7}{2}$$

$$m = \frac{1}{2}$$

Neither

2 points

10. Let $f(x) = x^2 - 6x + 8$. Find $f(-3)$.

$$f(-3) = 9 + 18 + 8$$

$$f(-3) = 35$$

$$f(-3) = 35$$

2 points

11. Solve the system and give the solution in the form (x, y) : $5x + 4y = -1$
 $7x + 6y = -2$

$$\begin{array}{r} -35x - 28y = 7 \\ 35x + 30y = -10 \\ \hline \end{array}$$

$$\begin{array}{r} 2y = -3 \\ y = -\frac{3}{2} \end{array}$$

$$\therefore 5x + 4\left(-\frac{3}{2}\right) = -1$$

$$\begin{array}{r} 5x - 6 = -1 \\ 5x = 5 \\ x = 1 \end{array}$$

$$\frac{\left(1, -\frac{3}{2}\right)}{3 \text{ points}}$$

12. Tickets for a show cost \$2.00 for adults and \$1.50 for children. A total of 425 individuals bought tickets to the event for a total of \$740. Write and solve a system of equations to determine how many of each type of ticket were sold. 5 points total

$$2A + 1.50C = 740$$

$$A + C = 425$$

$$\# \text{ of adult tickets: } \underline{205}$$

$$\begin{array}{r} 2A + 1.50C = 740 \\ -2A - 2C = -850 \\ \hline \end{array}$$

$$\begin{array}{r} -0.5C = -110 \\ -0.5 \quad -0.5 \end{array}$$

$$C = 220$$

$$\# \text{ of child tickets: } \underline{220}$$

$$\begin{array}{r} \therefore A + 220 = 425 \\ A = 205 \end{array}$$

13. Simplify the expression. Assume that all variables represent nonzero real numbers.

$$\left(\frac{3x^5}{x^{-2}}\right)^2 \left(\frac{x^{-3}}{36}\right)$$

$$\left(3x^7\right)^2 \left(\frac{1}{36x^3}\right)$$

$$\frac{9x^{14}}{36x^3} = \frac{1}{4}x^{11}$$

$$\frac{x^{11}}{4}$$

3 points

14. Simplify. $(3x - 2) - (4x^2 - 5x + 2)$

$$3x - 2 - 4x^2 + 5x - 2$$

$$-4x^2 + 8x - 4$$

$$\underline{-4x^2 + 8x - 4}$$

3 points

15. Find the product. $(5x+3)(3x-5)$
 $15x^2 - 16x - 15$

$$\frac{15x^2 - 16x - 15}{3 \text{ points}}$$

16. Divide: $\frac{4v^3 - 8v^2 + 3v + 4}{2v + 1}$

$$\begin{array}{r} 2v^2 - 5v + 4 \\ 2v+1 \overline{) 4v^3 - 8v^2 + 3v + 4} \\ \underline{4v^3 + 2v^2} \\ -10v^2 + 3v + 4 \\ \underline{+ 10v^2 - 5v} \\ 8v + 4 \\ \underline{8v + 4} \\ 0 \end{array}$$

$$\frac{2v^2 - 5v + 4}{3 \text{ points}}$$

17. Factor each completely.

a. $3x^2 + 7x - 20$
 $(3x - 5)(x + 4)$

a. $\frac{(3x - 5)(x + 4)}{3 \text{ points}}$

b. $a^2 + a - 5ab - 5b$
 $a(a+1) - 5b(a+1)$
 $(a-5b)(a+1)$

b. $\frac{(a+1)(a-5b)}{3 \text{ points}}$

c. $36m^4 - 9$
 $9(4m^4 - 1)$
 $9(2m^2 + 1)(2m^2 - 1)$

c. $\frac{9(2m^2 + 1)(2m^2 - 1)}{3 \text{ points}}$

d. $y^3 + 27$
 $(y+3)(y^2 - 3y + 9)$

d. $\frac{(y+3)(y^2 - 3y + 9)}{3 \text{ points}}$

18. Simplify. $(3x-2)^2$

$$9x^2 - 12x + 4$$

$$\frac{9x^2 - 12x + 4}{3 \text{ points}}$$

19. Solve the equation by factoring: $3x^2 - 8 = -10x$

$$\begin{aligned} 3x^2 + 10x - 8 &= 0 \\ (3x - 2)(x + 4) &= 0 \\ x = \frac{2}{3} \text{ or } x &= -4 \end{aligned}$$

$$\frac{\left\{ \frac{2}{3}, -4 \right\}}{3 \text{ points}}$$

20. Given the function $f(x) = \frac{x}{x+5}$,

a. Find all numbers that are **not** in the domain of the function

$$\frac{x \neq -5}{1 \text{ point}}$$

b. Give the domain in **interval notation**

$$\frac{(-\infty, -5) \cup (-5, \infty)}{2 \text{ points}}$$

21. Divide. Write all answers in lowest terms.

$$\frac{\begin{matrix} (x-3)(x+2) \\ x^2 - x - 6 \end{matrix}}{\begin{matrix} (x-4)(x-3) \\ x^2 - 7x + 12 \end{matrix}} \div \frac{\begin{matrix} (x-5)(x+2) \\ x^2 - 3x - 10 \end{matrix}}{\begin{matrix} (x-4)(x+2) \\ x^2 - 2x - 8 \end{matrix}}$$

$$\frac{\frac{x+2}{x-5}}{3 \text{ points}}$$

$$\frac{\cancel{(x-3)}(x+2)}{\cancel{(x-4)}(x-3)} \cdot \frac{\cancel{(x-4)}(x+2)}{(x-5)\cancel{(x+2)}}$$

22. Add or subtract as indicated. Write all answers in lowest terms.

$$\frac{2(x-y)}{x+y} + \frac{3(x+y)}{x-y} \cdot \frac{x-3y}{x^2-y^2}$$

$(x+y)(x-y)$

$$\frac{4}{x-y}$$

4 points

$$\frac{2x-2y + 3x+3y - x+3y}{(x+y)(x-y)} = \frac{4x + 4y}{(x+y)(x-y)}$$

$$= \frac{4}{x-y}$$

23. Simplify the complex fraction. Write all answers in lowest terms.

$$\frac{\frac{d^2 \cdot 1}{d^2} - \frac{1}{d^2} \cdot c^2}{c^2 d^2 \cdot \frac{1}{c} + \frac{1}{d} \cdot c^2 d^2} = \frac{d^2 - c^2}{cd^2 + c^2 d}$$

$$= \frac{(d-c)(\cancel{d+c})}{cd(\cancel{d+c})}$$

$$\frac{d-c}{cd}$$

4 points

24. Solve the equation.

$$\frac{-x^2 + 10}{x^2 - 1} + \frac{3x}{x-1} = \frac{2x}{x+1} \quad x \neq 1, x \neq -1$$

$$\{-2\}$$

3 points

$$-x^2 + 10 + 3x(x+1) = 2x(x-1)$$

$$-x^2 + 10 + 3x^2 + 3x = 2x^2 - 2x$$

$$2x^2 + 3x + 10 = 2x^2 - 2x$$

$$3x + 10 = -2x$$

$$5x = -10$$

$$x = -2$$

25. Evaluate.

$$\left(\frac{8}{27}\right)^{-2/3} = \left(\frac{27}{8}\right)^{2/3}$$

$$\frac{9}{4}$$

2 points

$$= \left[\left(\frac{27}{8}\right)^3\right]^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

26. Express the radical in simplified form. Assume that all variables represent positive real numbers.

$$\sqrt{54x^5y^8}$$

$$3x^2y^4\sqrt{6x}$$

$$3x^2y^4\sqrt{6x}$$

3 points

27. Multiply, and then simplify each product.

$$(2\sqrt{3}+1)(4\sqrt{3}-3)$$

$$8 \cdot 3 + 4\sqrt{3} - 6\sqrt{3} - 3$$

$$24 - 2\sqrt{3} - 3$$

$$21 - 2\sqrt{3}$$

$$21 - 2\sqrt{3}$$

3 points

28. Rationalize the denominator.

$$\frac{\sqrt{5}}{\sqrt{32}} = \frac{\sqrt{5} \sqrt{2}}{4\sqrt{2} \sqrt{2}} = \frac{\sqrt{10}}{4 \cdot 2} = \frac{\sqrt{10}}{8}$$

$$\frac{\sqrt{10}}{8}$$

2 points

29. Solve the equation:

$$\begin{aligned} \sqrt{3x+1} + 1 &= x \\ (\sqrt{3x+1})^2 &= (x-1)^2 \\ 3x+1 &= x^2 - 2x + 1 \\ 0 &= x^2 - 5x \\ 0 &= x(x-5) \end{aligned}$$

$x = 0$ or $x = 5$

$$\{5\}$$

3 points

30. Use the square root property to solve the equation and simplify the result:

$$\begin{aligned} x^2 - 18 &= 0 \\ x^2 &= 18 \\ x &= \sqrt{18} \text{ or } x = -\sqrt{18} \\ x &= 3\sqrt{2} \text{ or } x = -3\sqrt{2} \end{aligned}$$

$$\{3\sqrt{2}, -3\sqrt{2}\}$$

2 points

31. Use the quadratic formula to solve the equation and simplify the result:

$$\begin{aligned} x^2 + 4x + 1 &= 0 \\ x &= \frac{-4 \pm \sqrt{16 - 4(1)(1)}}{2(1)} \\ x &= \frac{-4 \pm \sqrt{12}}{2} \\ x &= \frac{-4 \pm 2\sqrt{3}}{2} = -2 \pm \sqrt{3} \end{aligned}$$

$$\{-2 + \sqrt{3}, -2 - \sqrt{3}\}$$

3 points

Notice

As stated in the University of Southern Indiana Bulletin, a "C" or better in Math 100 is required as a prerequisite to subsequent courses in mathematics. If you are currently pre-registered for Math 106, Math 108, Math 111, Math 112, or Math 118 and do not receive a course grade of "C" or better, you must withdraw from that class and re-enroll in Math 100. If you have attempted Math 100 twice without earning a grade of C or better, then you must enroll in the expanded offering of Math 100/101 for summer or fall. For assistance with schedule adjustment, please contact the Office of the Registrar at (812) 464-1762.