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

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

$6x+8 = 5x-3$

$-5x \quad -8 \quad -5x \quad -8$

$x = -11$

$\{-11\}$

3 points

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

$xy = C-R$

$C = xy+R$

$C = xy+R$

2 points

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

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

$10 = 6+2x$

$4 = 2x$

$2 = x$

$\{2\}$

2 points

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

$-\frac{2}{3} < \frac{x+2}{3} \le 4$ 1 point

$-2 < x+2 \le 12$

$-2 \quad -2 \quad -2$

$-4 < x \le 10$

1 point

$(-4, 10]$

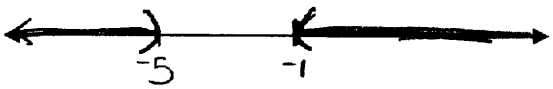
1 point

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

$3x > -3$ or $2 - x > 7$ (2 points)

$x > -1$ or $-x > 5$

$x < -5$



1 point

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

1 point

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

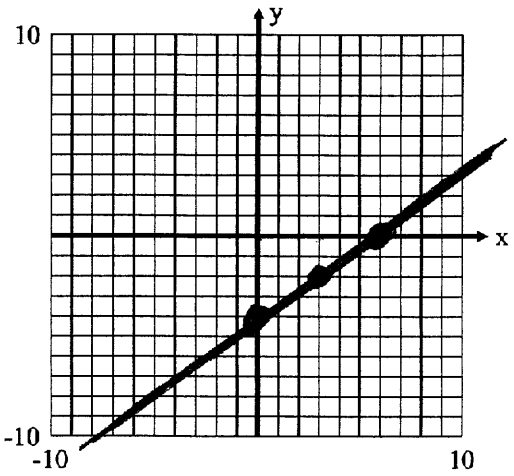
$2x + 6 = 12$

$2x = 6$

$x = 3$

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.**

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

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

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

$+1 \quad +1$

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

or

$y = mx + b$

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

$1 = 3 + b$

$-2 = b$

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

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

3 points

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

$2y = -x + 7$

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

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

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): $5x+4y=-1$, $7x+6y=-2$

$-35x - 28y = 7$
$35x + 30y = -10$

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

$\therefore 5x + 4\left(-\frac{3}{2}\right) = -1$
$5x - 6 = -1$
$5x = 5$
$x = 1$

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

3 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

$2A + 1.50C = 740$
$A + C = 425$

$2A + 1.5C = 740$
$-2A - 2C = -850$

$\frac{-.5C}{-.5} = \frac{-110}{-.5}$

$C = 220$

$\therefore A + 220 = 425$
$A = 205$

# of adult tickets: 205

# of child tickets: 220

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

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

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

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

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

3 points

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

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

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

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

3 points

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

$15x^2-16x-15$

$15x^2-16x-15$

3 points

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

$2v^2-5v+4$

$2v+1 \overline{)\,4v^3-8v^2+3v+4}$

$-4v^3 \mp 2v^2$

$-10v^2+3v+4$

$+10v^2 \mp 5v$

$8v+4$

$-8v \mp 4$

0

$2v^2-5v+4$

3 points

17. Factor each completely.

a. $3x^2+7x-20$

$(3x-5)(x+4)$

a. $(3x-5)(x+4)$

3 points

b. $a^2+a-5ab-5b$

$a(a+1)-5b(a+1)$

$(a-5b)(a+1)$

b. $(a+1)(a-5b)$

3 points

c. $36m^4-9$

$9(4m^4-1)$

$9(2m^2+1)(2m^2-1)$

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

3 points

d. y^3+27

$(y+3)(y^2-3y+9)$

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

3 points

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

$9x^2-12x+4$

$9x^2-12x+4$

3 points

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

$3x^2+10x-8=0$

$(3x-2)(x+4)=0$

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

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

3 points

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

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

$x \neq -5$

1 point

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

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

2 points

21. Divide. **Write all answers in lowest terms.**

$$\frac{x^2-x-6}{x^2-7x+12} \div \frac{x^2-3x-10}{x^2-2x-8}$$

$(x-3)(x+2)$ $(x-5)(x+2)$

$(x-4)(x-3)$ $(x-4)(x+2)$

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

$\frac{x+2}{x-5}$

3 points

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

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

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

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

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

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

4 points

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

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

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

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

4 points

24. Solve the equation.

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

$(x+1)(x-1)$

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

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

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

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

$$5x=-10$$

$$x=-2$$

$\{-2\}$

3 points

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

$$= \left[\left(\frac{27}{8}\right)^{\frac{1}{3}}\right]^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

$\frac{9}{4}$

2 points

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.

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

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

2 points

29. Solve the equation:

$\sqrt{3x+1}+1=x$

$(\sqrt{3x+1})^2 = (x-1)^2$

$3x+1 = x^2 - 2x + 1$

$-3x \quad -3x \quad -1$

$0 = x^2 - 5x$

$0 = x(x-5)$

~~$x=0$~~ or $x=5$

$\{5\}$

3 points

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

$x^2 - 18 = 0$

$x^2 = 18$

$x = \sqrt{18}$ or $x = -\sqrt{18}$

$x = 3\sqrt{2}$ or $x = -3\sqrt{2}$

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

2 points

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

$x^2 + 4x + 1 = 0$

$$x = \frac{-4 \pm \sqrt{16 - 4(1)(1)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{12}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{3}}{2} = -2 \pm \sqrt{3}$$

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

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.