Name_____

Date_____

MAT120

Final Exam Review

*****Show all work as necessary. Circle or underline your final answers*****

1. Evaluate: $15 - 11[4 + 2(6 - 3^2)]$

2. Evaluate: $-5^2 + (-3)^2$

3. Simplify: $6x + 2(3 - 7x)$

4. Simplify: $(-3x^5y^{-3})^3$

5. Simplify: $\left(\dfrac{12x^5y^{-4}z^2}{-3xy^2z^2}\right)^2$

6. Solve: $2 - 5(x + 3) = 2(4 - x)$

7. Solve: $6x + 2(x - 4) \le 12 - 2x$

8. Solve: $\dfrac{x-2}{4} + \dfrac{2}{3} > \dfrac{1}{2} - 2x$

9. Solve: $2|x + 5| - 7 = 11$

10. Solve: $|2x - 3| < 2$

11. Evaluate f(-3) given f(x) = $\dfrac{2x - 6}{x + 1}$

12. Find the x- and y-intercepts of the line:

$$2x - 3y = 8$$

13. Solve the system: $\begin{cases} y = 2x - 5 \\ 3x - 2y = 8 \end{cases}$

14. Find (f − g)(x) given f(x) = $2x^3 - 5x^2 + 4$

and g(x) = $x^3 - 2x^2 + 3x - 7$

15. Find (fg)(x) and (fg)(2) given
    $f(x) = x - 2$ and $g(x) = x^2 + 2x - 1$

16. Multiply: $(2x - 3)^2$

17. Factor: $2x^2y + 14x - 3xy - 21$

18. Factor: $9x^2 + 30x + 25$

19. Factor: $x^8 + 5x^4 - 36$

20. Factor: $8y^3 + 27$

21. Solve by factoring: $x(x - 6) = 16$

22. Simplify: $\dfrac{x^2 - 10x + 24}{16 - x^2}$

23. Multiply: $\dfrac{8x-12}{6x-6} \cdot \dfrac{2x^2-x-6}{4x^2-9}$

24. Divide: $\dfrac{x^3-8}{x^2-4} \div \dfrac{3x^3+6x^2+12x}{x^2+8x+6}$

25. Subtract: $\dfrac{2x^2-3x+7}{x^2+7x+12} - \dfrac{x^2-5x+10}{x^2+7x+12}$

26. Add: $\dfrac{3x-2}{x^2-x-6} + \dfrac{2x-3}{x^2-9}$

27. Simplify: $\dfrac{\dfrac{2}{x+3}+\dfrac{5x}{x^2-9}}{\dfrac{4}{x+3}+\dfrac{2}{x-3}}$

28. Divide: $(2x^3-3x^2+4x-5) \div (2x-3)$

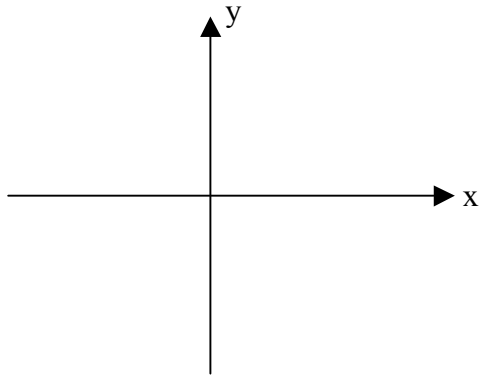29. Use synthetic division to solve

$2x^3 - 3x^2 - 11x + 6 = 0$
given -2 is a solution.

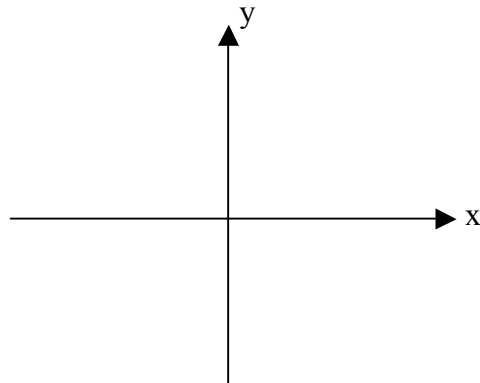30. Solve: $\dfrac{x}{x+1} + \dfrac{5}{x} = \dfrac{1}{x^2 + x}$

31. Graph the function by plotting points:

$f(x) = |x - 3|$

32. Solve by graphing:

$$\begin{cases} y \le \frac{1}{2}x + 3 \\ 2x + 3y > 3 \end{cases}$$

33. A rocket is launched from a 5-foot platform. The path of the rocket is modeled by the function $f(t) = -16t^2 + 96t + 5$, where $f(t)$ is the height in feet t seconds after launch. Find and interpret $f(3)$.

34. The length of a rectangular sign is 3 ft. less than twice the width. If the area of the sign is 54 sq. ft., find the length and width of the sign.

35. Cindy sets out on a bike ride on a windy day. Riding with the wind, she can ride 75 miles in the same time it takes her to ride 15 miles against the wind. Assume the wind is blowing a steady 10 mph. What is Cyndy's biking rate (without the wind affecting her)?

36. Peter can deliver his mail route in 6 hours. His substitute can do the job in 9 hours. How long would it take for them both to deliver the route together?

*****Show all work as necessary. Circle or underline your final answers*****

1. Find the domain of each function:

a. $f(x) = 2x - 3$

b. $g(x) = 3|x + 2|$

c. $h(x) = 2x^2 - 3x - 2$

d. $j(x) = \dfrac{x - 3}{x^2 - 4x + 3}$

e. $k(x) = \sqrt{3 - 2x}$

f. $n(x) = 4^x - 2$

g. $m(x) = \log_3(x + 2)$

2. Simplify each:

a. $\sqrt{25x^2 y^6}$

b. $\sqrt[3]{-16x^4 y^6}$

c. $\dfrac{\sqrt[5]{x^2}}{\sqrt{x}}$

d. $(-8)^{-\frac{2}{3}}$

e. $\sqrt{6} \cdot \sqrt{15}$

f. $2\sqrt[3]{16} + \sqrt[3]{54}$

g. $\dfrac{\sqrt{18x^7}}{\sqrt{2x}}$

h. $\sqrt[3]{\dfrac{4}{9}}$

i. $(2 - 3\sqrt{2})^2$

j. $\sqrt[3]{\sqrt{5x}}$

k. $(3 + 5i) - (7 - 3i)$

l. $\dfrac{2 + 3i}{1 - 2i}$

3. Solve each:

a. $\sqrt{2x + 4} = 6$

b. $x + \sqrt{2x - 3} = 3$

c. $2(x - 3)^2 = 16$

d. $3x^2 = 10x + 8$

e. $(2x - 1)(x + 2) = 4$

f. $\dfrac{5}{x + 1} + \dfrac{x - 1}{4} = 2$

g. $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 12 = 0$

h. $2x^2 + 5x > 3$

3. Solving, continued…

i. $\dfrac{x+3}{x-4} \le 5$

j. $4^{x+1} = \dfrac{1}{8}$

k. $\log_3(2x+5) = 2$

l. $\log(x+1) - \log(x-2) = \log 3$

m. $5^x = 14$

n. $\log_2 x + \log_2(x-2) = 3$

4. Graph each quadratic: identify the vertex, axis of symmetry, intercepts, domain, range, and max. or min. value.

a. $f(x) = -2(x+1)^2 + 8$

b. $g(x) = 2x^2 - 4x - 6$

5. Graph each function: identify the intercept(s), asymptote(s), domain and range.

a. $f(x) = 2^{x+3}$

b. $g(x) = \log_3 x$

6. Evaluate each given $f(x) = 2x^2 - 3x$, $g(x) = \dfrac{1}{2}x + 3$, $h(x) = \sqrt{x-4}$, $j(x) = x - 3$, $k(x) = \dfrac{1}{x+3}$:

a. $(f \circ j)(x)$

b. $(g \circ h)(8)$

c. $(f + g)(-2)$

d. $g^{-1}(-1)$

7. Using the functions in number 6, find each:

a. $g^{-1}(x)$

b. The domain and range of $k^{-1}(x)$

8. Alan and Tim can build a complete covered patio together in 56 hours. Alan could build the patio himself 15 hours quicker that Tim. How long would it take Tim to build the wall himself?

9. A ball player hits a pop fly to center field. The function $h(t) = -16t^2 + 64t + 5$ models the height, $h(t)$, in feet t seconds after he hits the ball. Find the maximum height the ball will reach and how long it will take to hit the ground (assuming no outfielder catches it).