Week in Review # 1

MATH 150

1.1 through 1.6

Drost-Fall 2002

1. Given $(x, -y)$ is in QII, which quadrant is the point (x, y) in?

2. Express as a quotient of integers: $2.536\overline{36}$.

3. Name the property illustrated:
   a. $4x(3x - 4y + 2) = 12x^2 - 16xy + 8x$
   b. $5x + (6x - 2) = (5x + 6x) - 2$

4. Write without absolute value signs:
   a. $| 4 - \sqrt{3} |$
   b. $| 2 - \pi |$

5. Simplify:
   a. $\dfrac{\frac{x}{y} - \frac{y}{x}}{\frac{1}{x^2} - \frac{1}{y^2}}$
   b. $1 + \dfrac{1}{1 + \dfrac{1}{1 + \frac{1}{x}}}$

6. Find $f(-3)$ and $f(5)$ given the function
$$f(x) = \begin{cases} 2x - 5 & \text{if } x \geq 2 \\ x^2 & \text{if } x < 2 \end{cases}$$

7. Expand:
   a. $(3x - 2y)(4x + y)$
   b. $(2x - 3)(x + 2)(4x - 5)$
   c. $(5x - y + 7)(5x + y + 7)$

8. Factor:
   a. $x^2 - 3x - 10$
   b. $x^2 - 7x + 10$
   c. $8x^2 - 14x - 15$
   d. $8x^3 - 125$
   e. $81x^3 - 24$

9. Simplify:
   a. $\dfrac{5x - 1}{5x + 2} \div \dfrac{25x^2 - 10x + 4}{125x^3 + 8}$
   b. $\dfrac{x + 3}{3x - 5} + \dfrac{2x + 1}{5 - 3x}$
   c. $\dfrac{4 - \frac{2}{x^2}}{\frac{x-2}{x}}$
   d. $(32)^{-\frac{2}{5}}$

10. Rewrite with only positive exponents:
    a. $\left(\dfrac{x^{-3} \cdot y^{-2}}{x^4}\right)^2$
    b. $5x(x^{-\frac{1}{2}} + 2)^2$

11. Rationalize the denominator: $\dfrac{a - b}{\sqrt{a} + \sqrt{b}}$

12. Rationalize the numerator: $\dfrac{\sqrt{x + h} - \sqrt{x}}{h}$

13. Simplify:
    a. $\sqrt[3]{54} - \sqrt[3]{128}$
    b. $\dfrac{(x^2y^3)^3(xy^2)^{-2}}{(x^3y^{-3})^{-1}}$
    c. $(2x^4y^{-\frac{4}{5}})^3(8y^2)^{\frac{2}{3}}$
    d. $(\sqrt{x^4 + 5} - 2)(\sqrt{x^4 + 5} + 2)$

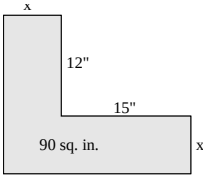
14. Expand:
    a. $(2x - 3y)^3$
    b. $(5x - 3y - 4)(5x - 3y + 4)$

15. True or False:
    a. $\sqrt{x^6} = x^3$
    b. The domain of $f(x) = \dfrac{\sqrt{x - 1}}{x^2 - 25}$ is:
    $\{\Re, x > 1, x \neq 5\}$.
    c. $-\pi > -3$
    d. $1 = .\overline{9}$
    e. Non-negative means positive.

16. Given $R = \{-2, 0, 4, 6\}, S = \{0, 1, 2, 3\}$
    a. find $R \cup S$
    b. find $R \cap S$

17. A sealed box measuring $2\frac{1}{2}$m wide, 4 m long, and 2 m tall is filled with pure oxygen. One cubic meter contains 1000 L and 22.4 L of any gas contains $6.02x10^{23}$ molecules. How many molecules of oxygen are there in the box?

18. Given the following figure, solve for x, given the shaded area is 90 sq. in.



19. Solve:
    a. $5(x + 3) + 9 = -2(x - 2) - 1$
    b. $8x^2 - 6x - 9 = 0$
    c. $2x + \sqrt{x + 1} = 8$

20. Solve for a:
$$\frac{a + 1}{b} = \frac{a - 1}{b} + \frac{b + 1}{a}$$

21. Factor:

a. $x^5 - 9x^3 - x^2 + 9$

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

c. $x^4 + 2x^2 + 9$

d. $(x-1)(x+2)^2 - (x-1)^2(x+2)$

e. $x^{-\frac{3}{2}}(x+1)^{\frac{3}{2}} + x^{-\frac{1}{2}}(x+1)^{\frac{1}{2}}$

f. $(a^2+2a)^2 - 2(a^2+2a) - 3$

22. Find the perimeter in feet of a rectangle that is twice as long as it is wide.

23. The concentration of lemon juice in the lemonade is 5%. How much water should be added to 4 cups of the lemonade, to reduce the concentration to 2%?

24. Find the domain:

a) $f(x) = \dfrac{x+1}{2x(x-3)}$

b) $f(x) = \sqrt[3]{x+1}$

c) $f(x) = x^2 + 4x + 4$

25. Graph the following piecewise defined function:

$$f(x) = \begin{cases} 2x & \text{if } x < -2 \\ x^2 & \text{if } -2 \le x \le 0 \\ 5 & \text{if } x > 0 \end{cases}$$

ANSWERS:

1. QIII

2. $\dfrac{279}{110}$

3. a) distributive property; b) associative property of addition

4. a) $4 - \sqrt{3}$; b) $\pi - 2$

5. a) $-xy$; b) $\dfrac{3x+2}{2x+1}$

6. a) 9; b) 5

7. a) $12x^2 - 5xy - 2y^2$; b) $8x^3 - 6x^2 - 29x + 30$

7. c) $25x^2 + 70x + 49 - y^2$

8. a) $(x-5)(x+2)$; b) $(x-5)(x-2)$

8. c) $(4x+3)(2x-5)$; d) $(2x-5)(4x^2+10x+25)$

8. e) $3(3x-2)(9x^2+6x+4)$

9. a) $5x - 1$; b) $\dfrac{2-x}{3x-5}$;

9. c) $\dfrac{4x^2-2}{x^2-2x}$; d) $\dfrac{1}{4}$

10. a) $\dfrac{1}{x^{14}y^4}$; b) $5 + 20x^{\frac{1}{2}} + 20x$

11. $\sqrt{a} - \sqrt{b}$

12. $\dfrac{1}{\sqrt{x+h} + \sqrt{x}}$

13. a) $-\sqrt[3]{2}$; b) x^7y^2;

13. c) $\dfrac{32x^{12}}{y^{\frac{16}{15}}}$; d) $x^4 + 1$

14. a) $8x^3 - 36x^2y + 54xy^2 - 27y^3$

14. b) $25x^2 - 30xy + 9y^2 - 16$

15. a) false; b) false; c) false; d) true; e) false

16. a) $R \cup S = \{-2, 0, 1, 2, 3, 4, 6\}$; b) $R \cap S = \{0\}$

17. $5.375x10^{26}$

18. x = 3 inches

19. a) x = -3; b) x = $\dfrac{-3}{4}, \dfrac{3}{2}$

19. c) x = 3

20. $\dfrac{b^2+b}{2}$

21. a) $(x-3)(x+3)(x-1)(x^2+x+1)$;

21. b) $2(x^2+4)^4(x-2)^3(7x^2-10x+8)$

21. c) $(x^2+2x+3)(x^2-2x+3)$; d) $3(x-1)(x+2)$

21. e) $\dfrac{(2x+1)\sqrt{x+1}}{x^{\frac{3}{2}}}$; f) $(a+3)(a-1)(a+1)^2$

22. $P = 6w$, where w = width in feet

23. 6 cups

24. a) $\Re, x \neq 0, 3$, b) $\Re$; c) $\Re$

25.