

# Week in Review # 1

MATH 142

Drost-Spring 2010

Algebra Review, 2.2 through 2.4

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## 1. Algebra Review

a) Simplify:  $16^{-\frac{3}{2}}$

b) Factor:  $3x^2 - 5x - 2$

c) Simplify:  $\frac{2}{x+3} - \frac{1}{x}$

d) Simplify:

i.  $\sqrt[4]{x^{12}}$

ii.  $\sqrt[4]{x^8}$

e) Multiply and simplify:

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

f) Factor completely:  $x^4 - 6x^3 + 9x^2$

g) Tonya had one-third of the problems finished before dinner. After dinner she completed 8 more problems, and then took a break since she was half way done. How many problems were assigned?

h) Simplify completely:

$$\frac{2x^2 - 7x - 4}{x^2 - 7x + 12}$$

## 2. Finding the domain of the function

a)  $f(x) = \sqrt{3} \cdot x^2 - 4x + 1$

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

c)  $f(x) = \sqrt{x^2 - 4}$

d)  $f(x) = \begin{cases} \frac{-x}{x+5} & \text{if } x < 0 \\ \frac{x+1}{x} & \text{if } x \geq 2 \end{cases}$

e)  $f(x) = |x|$

f)  $f(x) = \frac{\sqrt{x+5}}{x+1}$

## 3. Be able to express your answer in each of the following forms:

Interval Notation	Inequality Notation
a. $[-4, 3)$	
b.	$-2 < x \leq 5$
c. $(-\infty, 2]$	

## 4. Find the average rate of change between the following sets of points:

a.  $(8, -3)$  and  $(5, 2)$

b.  $(a, b - 1)$  and  $(a - 1, b + 1)$

5. Write the equation of the line passing through the point  $(5, -2)$  that:
- has an x-intercept of 2.
  - that passes through the origin.
  - that is horizontal.

6. Maximum Monitor priced the 18" sets for \$2400 and sold 32. The following weekend they moved the price to \$2375 and sold 35. Find a price-demand function which fits this model.

7. A new DVD player costs \$200 and in 2 years is worth \$185.

- What is the equation for this depreciation function, assuming it is linear?
- What is the value of the DVD player in six years?
- What is the life expectancy of this machine?

8. Company XYZ makes stereos for \$135 each, pays rent of \$875 per month, \$100 per month for utilities and \$2600 per month in salaries. The store across the street only pays \$680 per month rent. If the stereos sell for \$280 each, find:

- cost equation
- revenue equation
- break even point
- profit or loss when 2000 stereos are made and sold each month.

9. The amount spent annually in college bookstores in the U.S. is modeled by

$$f(x) = .19x + 1.6$$

where  $x$  is the number of years since 1982, and  $f(x)$  is the amount spent in billions of dollars.

- How much is the spending increasing each year?
- According to this model, how much was spent in 1990?

10. Given  $f(x) = x^2 - 6x + 8$ ,  $g(x) = \sqrt{9 - x^2}$ , and  $h(x) = x^2 - 16$ .

- Find  $(f - h)(x)$  and state the domain.
- Find  $\left(\frac{f}{h}\right)(x)$  and state the domain.
- Find  $\left(\frac{h}{g}\right)(x)$  and state the domain.

11. Given:  $4x + 2y = 30$ . If  $x$  increases  $2a$ , how is the  $y$  value changed?

12. Given  $p(x) = 105.7 - .89x$  and variable costs are \$80/unit and fixed costs are \$61.80.
- Find the cost equation.
  - Find the revenue equation.
  - Find the profit equation.
  - Find the break even point.
13. Find the average rate of change for  $f(x) = 3x^2 - x + 5$  when  $x = 2$  and  $\Delta x = 4$ .
14. Solve the following double inequality for  $x$ :

$$2x - 4 \leq 36 < 5x + 11$$

15. Supply and Demand :

Year	Supply	Demand	Price in dollars
1990	250	300	125
1995	275	275	150

- Find a linear price-supply equation.
- Find a linear price-demand equation.
- Find the equilibrium price.

16. Basic Elementary Functions

Column A	Column B
1. $f(x) = x^2$	a. shaped like a "v"
2. $g(x) = \sqrt{x}$	b. increasing function, concave up
3. $h(x) =  x $	c. parabola which opens up
4. $F(x) = 2^x$	d. half a parabola which opens to the right
5. $G(x) = \sqrt{x}$	e. increasing function, concave down

17. Graph the piece-wise defined function

$$f(x) = \begin{cases} -2x + 4, & x \leq 2 \\ x^2 - 1, & x > 2 \end{cases}$$

18. Write a function to represent the cost of  $x$  items when the store sells the items at \$5 each if you buy less than four items, and charges \$3.50 each for additional items up to ten. Let  $x$  represent the number of items purchased.
19. Find the vertex of the parabola  $f(x) = 3x^2 - 12x + 2$ .
- Find the domain of  $f(x)$ .
  - Find the range of  $f(x)$ .
20. Given:  $g(x) = 4(x - 2)^2 + 5$
- Find the  $x$ -intercept.
  - Find the  $y$ -intercept.
  - Find the axis of symmetry.
21. Find the equation of the parabola which opens up and has a vertex at  $(2, -3)$ , and passes through the point  $(4, 1)$ .

22. Given the price demand function is  $p = 3x + 12$  and the fixed cost is \$288 and the variable costs are \$24. Find the break-even point(s).

23. Which of the following are polynomials?

- $3x^{-2} + 4x - 12$
- $\pi x^3 + 4x - 2$
- $4\sqrt{x} + 5$
- $\frac{2x + 10}{x - 5}$

24. Solve:

- $8^{x+2} = 16^{5-x}$
- $25 * 5^x = 5^{3x+4}$

25. If  $t$  represents the time in hours spent studying for the exam, and the average score is described by the function  $N = 25(4 - 3e^{-0.1t})$ .

- If a student does not study, what does this model predict their score will be?
- If the time spent studying approaches infinity, what does this model predict their score will be?

26. Centerville Bank offers 5% interest compounded monthly, and Bank of Tomorrow offers continuously compounded interest at 4.75%. If you invest \$2500 for 5 years, what would be the account balance in each bank, assuming no withdrawals?