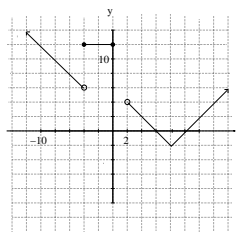


Math142 Week In Review # 2

The Most Important Problems to Understand - This Week



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

a. $(8, -3)$ and $(5, 2)$ ans: $-\frac{5}{3}$

b. $(a, b - 1)$ and $(a - 1, b + 1)$ ans: -2

2. Write the equation of the line passing through the point $(5, -2)$ that:

a. has an x-intercept of 2. ans: $2x + 3y = 4$

b. that passes through the origin. ans: $2x + 5y = 0$

c. that is horizontal. ans: $y = -2$

3. The 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.

ans: $p = -\frac{25}{3}x + \frac{8000}{3}$

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

- a. What is the equation for this depreciation function, assuming it is linear?

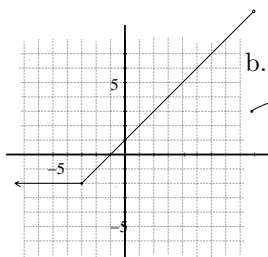
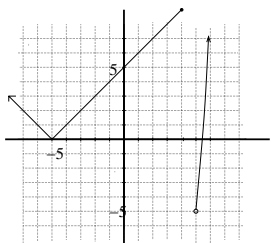
ans: $V = -7.5t + 200$

- b. What is the value of the DVD player in six years? ans: \$155

- c. What is the life expectancy of this machine? ans: $t = 26\frac{2}{3}$ yrs

5. Make an accurate graph for each of the following:

a. $f(x) = \begin{cases} |x + 5|, & x \leq 4 \\ x^2 - 30, & x > 5 \end{cases}$



b. $g(x) = \begin{cases} -2, & x < -3 \\ x + 1, & -3 \leq x < 9 \\ \sqrt{x}, & x \geq 9 \end{cases}$

6. Write a piece-wise defined function to represent the function above.

ans: $f(x) = \begin{cases} -x + 2, & x < -4 \\ 12, & -4 \leq x \leq 0 \\ |x - 8| - 2, & x > 2 \end{cases}$

7. 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.

- a. How much is the spending increasing each year? ans: \$190,000,000/year

- b. According to this model, how much was spent in 1990? ans: \$3.12 billion

8. Given: $P(x) = 3x^2 - 39x + 120$,

- a. find the intervals over which the function is increasing and decreasing.

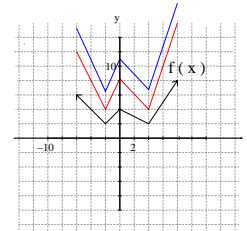
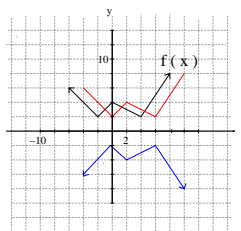
ans: increasing $(6.5, \infty)$
decreasing $(-\infty, 6.5)$

- b. find the axis of symmetry. ans: $x = 6.5$

9. Using the graph of $f(x)$ below, sketch the graph of each of the following functions.

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

b. $y = 2f(x) + 3$



10. Write the equation of the parabola which opens up, passes through the point $(-4, 8)$ and has a vertex at $(1, -2)$.
ans: $y = \frac{2}{5}(x - 1)^2 - 2$
11. Given $p(x) = 105.7 - .89x$ and variable costs are \$80/unit and fixed costs are \$61.80.
- Find the cost equation.
ans: $C = 80x + 61.80$
 - Find the revenue equation.
ans: $R = 105.7x - .89x^2$
 - Find the profit equation.
ans: $P = 25.7x - .89x^2 - 61.80$
 - Find the break even points.
ans: $(2.67, 2160.12), (26.23, 2160.12)$
12. Determine if each of the following is a polynomial:
- $f(x) = 5x^2 - \pi x + 4$ ans: yes
 - $g(x) = 3x - \frac{2}{x-3} + 10$ ans: yes
 - $h(x) = \sqrt{16x^3}$ ans: no
 - $F(x) = 3ix^2 + 9$ ans: no
13. Determine the end line behavior of each of the following:

	as $x \rightarrow \infty$	as $x \rightarrow -\infty$
a. $f(x) = 4x^3 - 6x + 4$		
b. $g(x) = -6x^4 - 4x + 2$		
c. $h(x) = -2x^5 + 7x + 12$		

	as $x \rightarrow \infty$	as $x \rightarrow -\infty$
a. $f(x) = 4x^3 - 6x + 4$	∞	$-\infty$
b. $g(x) = -6x^4 - 4x + 2$	$-\infty$	$-\infty$
c. $h(x) = -2x^5 + 7x + 12$	$-\infty$	∞

14. Given the function $g(x) = \frac{3x^2 + 5x - 2}{3x^2 - 10x + 3}$,
- find any holes, vertical asymptotes, or horizontal asymptotes.
ans: hole at $x = \frac{1}{3}$, VA at $x = 3$, HA at $y = 1$
 - find any intercepts. ans: $(-2, 0), (0, -\frac{2}{3})$
 - graph.
15. Given the function $f(x) = \frac{2x^2 + 10x + 12}{x^2 - 9}$,
- find any holes, vertical asymptotes, or horizontal asymptotes.
ans: hole at $x = -3$, VA at $x = 3$, HA at $y = 2$
 - find any intercepts. ans: $(0, -\frac{4}{3}), (-2, 0)$
 - graph.
16. Given the function $h(x) = \frac{6 - 3x}{x - 6}$,
- find any holes, vertical asymptotes, or horizontal asymptotes.
ans: no holes, VA at $x = 6$, HA at $y = -3$
 - find any intercepts. ans: $(0, -1), (2, 0)$
 - graph.
17. The Medical Diagnostic Lab, Inc. has developed a new low cost test for heartworm in dogs, and promotes sales through a sales campaign. The income from sales is given by
- $$S(x) = \frac{50x^2 - 200x + 9}{2x^2 + 10x + 1} \quad x \geq 5$$
- where x represents the number of thousands of dollars spent on advertising and $S(x)$ represents the income from sales in tens of thousands of dollars.
- Evaluate $S(8)$ and interpret.
ans: $S(8) = 7.6985646$, When \$8,000 is spent on ads, the result is \$76,985.65 income from sales.
 - Find the horizontal asymptote and interpret.
ans: $y = 25$, With additional dollars spent on ads, the income from sales approaches \$250,000.