Today's Plan:

Learning Target (standard): I will evaluate and describe infinite limits. I will analyze asymptotic behavior.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make neccessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

p.73 #1-18

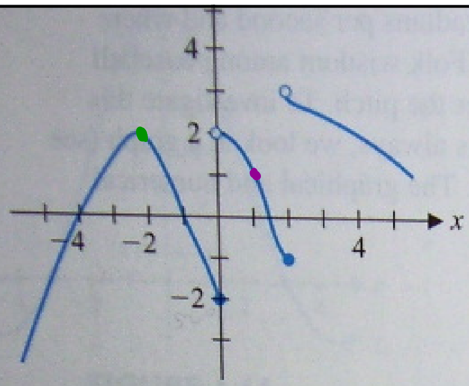
1) 4
2) 3
3) -6
4) $-^{25}/_{4}$
5) 3
6) 0
7) -1
8) 1
9) 1
10) -1
11) $^{1}/_{8}$
12) 0
13) 1
14) -1
15) ∞
16) $-\infty$

17a) 6

b) 4

18a) 8

b) 0



7. (a) $\lim_{x\to 0^-} f(x) = -2$ (b) $\lim_{x\to 0^+} f(x) = 2$ (c) $\lim_{x\to 0} f(x) = \text{DNE}$

(d) $\lim_{x\to -2^-} f(x) = 2$ (e) $\lim_{x\to -2^+} f(x) = 2$ (f) $\lim_{x\to -2} f(x) = 2$

(g) $\lim_{x\to -1} f(x) = 0$ (h) $\lim_{x\to 1^-} f(x) = 1$

8. (a) $\lim_{x\to 1^-} f(x) = 1$ (b) $\lim_{x\to 1^+} f(x) = 1$ (c) $\lim_{x\to 1} f(x) = 1$

(d) $\lim_{x\to 2^-} f(x) = -1$ (e) $\lim_{x\to -2^+} f(x) = 2$ (f) $\lim_{x\to 2} f(x) = \text{DNE}$

(g) $\lim_{x\to 3^-} f(x)$ (h) $\lim_{x\to 3} f(x)$

Evaluate:

$$\lim_{x\to 7^-}\left(\sqrt{x^2-49}+6\right) = \text{DNE}$$

$$\lim_{x\to 7^+}\left(\sqrt{x^2-49}+6\right) = 6$$

$$\lim_{x\to 7}\left(\sqrt{x^2-49}+6\right) = \text{DNE}$$

$$f(x)=\begin{cases}2x^2, x\le 2\\ 8, x>2\end{cases}$$

$$\lim_{x\to 2^-} f(x) = 8$$

$$\lim_{x\to 2^+} f(x) = 8$$

$$\lim_{x\to 2} f(x) = 8$$

* Explain the general limit

The limit of f(x) as x approaches 2 does exist. The left-hand limit as x approaches 2 is 8 and the right-hand limit as x approaches 2 is also 8. In order for the general limit to exist, the left-hand limit and the right-hand limit must be equal. Since the left-hand and right-hand limits as x approaches 2 are both equal to 8, the general limit as x approaches 2 is 8.

Horizontal & Oblique Asymptotes: "End Behavior"

1) HA: $y = 0$

- if the degree of the top is smaller than the degree of the bottom

2) HA: $y = \#$

- if the two degrees are equal

3) OA: $y = mx+b$

- if the degree of the top is 1 bigger than the degree of the bottom
  - long division

4) Other end behavior

- if the degree of the top is more than 1 bigger than the degree of the bottom
  - long division

Limits as x Approaches ∞ :

- Limits are defined for rational functions
  - if the function is not rational, make it rational → conjugate
- Divide every term in the numerator and denominator by the variable and exponent of the "degree-defining" term in the denominator
- Simplify and evaluate the limit

Evaluate:

$$\lim_{x\to\infty}\frac{2x^2-3x+4}{4-x} = \lim_{x\to\infty}\frac{\frac{2x^2}{x}-\frac{3x}{x}+\frac{4}{x}}{\frac{4}{x}-\frac{x}{x}}$$

$$=\lim_{x\to\infty}\frac{2x-3+\frac{4}{x}}{\frac{4}{x}-1}$$

$$=\frac{2(\infty)-3+\frac{4}{\infty}}{\frac{4}{\infty}-1} \qquad \frac{4}{1000000}\approx 0$$

$$=\frac{\infty}{-1}$$

$$=-\infty$$

Evaluate:

$$\lim_{x\to\infty}\left(\sqrt{x^2+3x}-x\right)\cdot\frac{\sqrt{x^2+3x}+x}{\sqrt{x^2+3x}+x}$$

$$=\lim_{x\to\infty}\frac{x^2+3x-x^2}{\sqrt{x^2+3x}+x}$$

$$=\lim_{x\to\infty}\frac{3x}{\sqrt{x^2+3x}+x}$$

$\sqrt{x^2}=x$

$$=\lim_{x\to\infty}\frac{\frac{3x}{x}}{\sqrt{\frac{x^2}{x^2}+\frac{3x}{x^2}}+\frac{x}{x}}$$

$$=\lim_{x\to\infty}\frac{3}{\sqrt{1+\frac{3}{x}}+1}$$

$$=\frac{3}{\sqrt{1+0}+1}$$

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

Assignment:

p.171 #1-12

Show ALL steps