Math 130 Day 34

Office Hours (LN 301/301.5): M 3:30-4:30, Tu 11:00-1:00, W 12:15-1:15, F 1:30-2:30. Other times by appointment. **Math Intern:** Sun through Thurs: 3:00–6:00, 7:00–10:00pm. **Website:** Use the links at the course homepage on **Canvas** or go to my course Webpage: `http://math.hws.edu/~mitchell/Math130F16/index.html`.

Today we will return to section 4.3 and finish our discussion on graphing with both horizontal and vertical asymptotes and limits at ∞. Recall that we earlier defined:

1. Vertical Asymptote. The function $y = f(x)$ has a vertical asymptote at $x = a$ if either

$$\lim_{x\to a^+} f(x) = +\infty \text{ or } -\infty \qquad \text{and/or} \qquad \lim_{x\to a^-} f(x) = +\infty \text{ or } -\infty.$$

2. Horizontal Asymptote. The function $y = f(x)$ has a horizontal asymptote at $y = L$ if either

$$\lim_{x\to+\infty} f(x) = L \qquad \text{and/or} \qquad \lim_{x\to-\infty} f(x) = L.$$

Practice and Reading

1. Page 268 #11, 15, and 17. (Draw complete graphs including any HA's and VA's.)

2. Additional Practice: Sketch a function that satisfies these conditions. Indicate on your graph which points are local extrema and which are inflections. **NID** means the point is "not in the domain" of the original function. Let $f(0) = 0$ and $\lim_{x\to 2^+} f(x) = -\infty$, $\lim_{x\to 2^-} f(x) = +\infty$, $\lim_{x\to+\infty} f(x) = -1$, and $\lim_{x\to-\infty} f(x) = -\infty$.

f'	$+\,+\,+$	0	$+\,+$	NID	$+\,+$
		0		2	

f''	$-\,-\,-$	0	$+\,+$	NID	$-\,-$
		0		2	

Exam III

Exam on Monday in Albright Auditorium. Come 15–20 minutes early. Coverage:

- **a)** Finding extreme values on a closed interval or an interval with a single relative extrema.
- **b)** Graphing a function using first and second derivatives (relative extremes, inflections, concavity, increasing and decreasing behavior);
- **c)** Graphing a function for which you are given some information (e.g., number lines for the first and second derivatives, or a graph of the first derivative);
- **d)** Related Rate problems;
- **e)** Optimization problems (including justification);
- **f)** Definitions and theorems and using them (e.g., MVT, EVT, CIT, SCPT, First Derivative Test, Concavity Test, critical point, absolute max or min, drawing functions with specified properties);
- **g)** Logarithmic differentiation;
- **h)** Derivatives of general exponentials $y = b^{f(x)}$
- **i)** Review the homework and labs since the last exam and Practice Test now online (answers Friday).

Hand In at Lab

0. WeBWorK Set Day 34. Due Monday.

1. Due in Lab. Draw a detailed graph of $g(x) = \dfrac{4x-2}{x+5}$. Determine the domain and then both vertical and horizontal asymptotes, if any. Determine and label all extrema and inflections. Indicate any intercepts as well. Simplify derivatives. Show all work. [Check answers with WeBWorK Day 34, Problem #1.] Use the back of the page. **Neatness counts.** Use pencil and do a good job on the graph. Messy papers will be rejected. ☞

99. Bonus. Draw a detailed graph of $g(x) = \dfrac{x^2-3}{x^2+3}$. Include and label all extrema, inflections, vertical and horizontal asymptotes, if any. Indicate any intercepts as well. (Graph paper available at our website.)

Put all your work here for the graph of $g(x) = \dfrac{4x - 2}{x + 5}$.