TA: Kyle Hansen (kylehansen@math.ucsb.edu)
Office: South Hall, 6431 V
OH: M 11-12pm / **ML:** Th 1-3pm

Name:

Collaborators:

Section Day/Time:

L'Hôpital's Rule and Sketching Curves

WebWork

13. Find $\lim_{x\to 0}(1-2x)^{1/x}$. Use l'Hôpital's Rule if appropriate. If the limit is $\pm\infty$, explain why. If the limit does not exist, explain why.

20. Consider the graph of the function $f(x) = \dfrac{-2x^2+5x-1}{2x-1}$.

a) What is the y-intercept of the graph?

b) What are the x-intercepts of the graph?

c) At what values of x does the graph have a vertical asymptote?

d) At what values of y does the graph have a horizontal asymptote?

e) What is the equation of the slant asymptote with the highest slope?

f) For what values of x is f decreasing?

g) For what values of x is f concave up?

38. A farmer with 720 ft of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle. What is the largest possible total area of the four pens?

Group Work

L'Hôpital's Rule

If $\lim_{x\to a} \frac{f(x)}{g(x)}$ has the form _____ or _____, **L'Hôpital's Rule** says that $\lim_{x\to a} \frac{f(x)}{g(x)} =$

1. Calculate the following limits:

a) $\lim_{x\to\infty} \frac{\ln(3x)}{x^2}$

b) $\lim_{x\to 1^+} \left(\frac{1}{\ln(x)} - \frac{1}{x-1}\right)$

c) $\lim_{x\to\infty} (e^x + x)^{1/x}$

2. Sketch the graph of $f(x) = \dfrac{x^2 + x - 2}{x^2}$, filling in the following guide taken from lecture notes. (Try not to look at your notes unless absolutely needed.)

a) Determine the _____ of f.

b) Find the x- and y- _____ of the graph.

c) Determine the _____ (even/odd) of the graph (if it exists).

d) Find the vertical _____ of f.

e) Determine the behavior at the _____ of the graph by looking at _____ and _____.

f) Draw number lines and use derivatives (f' and f'') to determine where f is ...

i)

ii)

iii)

iv)

Use this information to determine all local and absolute _____.

g) _____ f at the "interesting" places (i.e., at places such as those in parts b & f).

h) _____ the graph using all the information, and "connecting the dots".