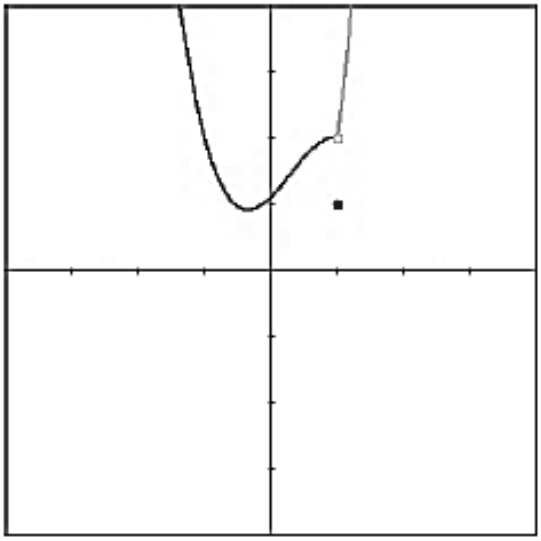
Homework 4.3 – Continuity and L'Hôpital's Rule

1. (1 pt) alfredLibrary/AUCI/chapter4/lesson3/continuous10pet.pg

Let f be the function below.



Note: you can click on the graph to get a larger image.

Determine the following for the function f at $x = 1$.

$\lim_{x\to 1^-} f(x) =$ _____

$f(1) =$ _____

$\lim_{x\to 1^+} f(x) =$ _____

Is this function continuous at $x = 1$? _____

2. (1 pt) alfredLibrary/AUCI/chapter4/lesson3/quiz/question11pet.pg

Find the constant c that makes f continuous everywhere.

$$f(x) = \begin{cases} cx^2 + 7x, & x < 2 \\ x^3 - cx, & x \geq 2 \end{cases}$$

$c =$ _____

3. (1 pt) alfredLibrary/AUCI/chapter4/lesson3/applyhospitals.pg

For which of the following limits is it appropriate to use l'Hospital's rule? Note that you have a limited number of attempts.

- A. $\lim_{x\to\infty} \frac{x^2-3x+2}{x^2+5x-14}$
- B. $\lim_{x\to 2} \frac{x^2+8x-9}{x^2+6x-7}$
- C. $\lim_{x\to 2} \frac{x^2-4x+4}{x^2-3x+2}$
- D. $\lim_{x\to 2} \frac{x^2+6x-7}{x^2+16x+63}$
- E. $\lim_{x\to-\infty} -\frac{9}{-7x+1}$
- F. $\lim_{x\to 2} \frac{x^2+7x-18}{x^2-4x+4}$

4. (1 pt) alfredLibrary/AUCI/chapter4/lesson3/quiz/lhopitals2pet.pg

Suppose that direct substitution into a given limit yields the indeterminate form $\frac{0}{0}$ or $\frac{\pm\infty}{\pm\infty}$. Then we can apply L'Hopital's rule.

Suppose that direct substitution into the result yields the indeterminate form $\frac{0}{0}$ or $\frac{\pm\infty}{\pm\infty}$. Then we can apply L'Hopital's rule again, and so on...

That is, we can continue to apply L'Hopital's rule as long as the resulting limit has the form $\frac{0}{0}$ or $\frac{\pm\infty}{\pm\infty}$, so **be sure to check the limit each time you apply the rule!**

Compute the limit below. You will need to apply L'Hopital's rule twice.

$\lim_{x\to\infty} \frac{-7x^2+3x+7}{2x^2-6x-5}$ $= \lim_{x\to\infty}$ _____

$= \lim_{x\to\infty}$ _____

$=$ _____

(Be sure that you understand why you need to use L'Hopital's rule two times for this limit, and why you cannot use it a third time!)

5. (1 pt) alfredLibrary/AUCI/chapter4/lesson3/lhopitals10pet.pg

Use L'Hopital's rule to evaluate each limit.

(a) $\lim_{x\to -7} \frac{-5x^2-44x-63}{x+7}$ $= \lim_{x\to -7}$ _____

$=$ _____

(b) $\lim_{x\to 2} \frac{2x^2+2x-12}{(x-2)(x-1)}$ $= \lim_{x\to 2}$ _____

$=$ _____