

Math 1, Fall 2003
Goals for Week 8: November 10-14, 2003

Left and Right Limits: You should have an intuitive understanding of what a left limit is and what a right limit is. If you look at the graph of a nice function, you should be able to determine its left and right limits, if they exist, at some point. You should know the notation for left and right limits. You should see how the concepts of left and right limits and left and right vertical asymptotes are related to each other.

Continuous and Piecewise Continuous Functions: You should have an intuitive understanding of what it means for a function to be continuous at a point and what it means for a function to be continuous. You should know the definition of continuity at a point in terms of left and right limits and the value of the function at that point. You should know which functions we have studied so far in this class are continuous. You should know what it means for a function to have a limit at a point, even when it is discontinuous at that point. You should know what a piecewise continuous function is. Given a piecewise continuous function $f(x)$, you should be able to sketch $f(x)$ and determine where it is continuous, where it is discontinuous, and what its left and right limits are at its discontinuities. You should know that if a function is discontinuous at a point, it cannot have a derivative at that point either.

Rational Polynomial Functions and Their Domains: You should know what a rational polynomial function is. Given a rational polynomial function $f(x)$, you should be able to find its domain, and you should be able to apply the quotient rule to find its derivative.

Polynomial Long Division: Given a rational polynomial function, you should be able to apply polynomial long division to find its polynomial part and its remainder. You should be aware that sometimes a function has a polynomial part of 0, and that sometimes a function has a remainder of 0. You should know what the difference is between, for example, the function $\frac{x^2-16}{x+4}$ and the function $x - 4$.

Asymptotes and Limits of Rational Polynomial Functions: Given a rational polynomial function $f(x)$ with polynomial part $a(x)$ and remainder $r(x)$, you should be able to use its polynomial part to determine its behavior for very large positive numbers and very large negative numbers. You should know what a slant asymptote is. You should know what types of polynomials $a(x)$ give rise to horizontal asymptotes, and what $a(x)$ give rise to slant asymptotes. You should be able to use the remainder of $f(x)$ to determine where $f(x)$ has left and right vertical asymptotes, and whether those vertical asymptotes are positive or negative. You should know that if $r(x) = 0$ then $f(x)$ has no vertical asymptotes.

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Lecture Notes for Week 8: Lectures 18 and Lecture 19

Homework for Week 8: Homework 15 and Homework 16