Math 1, Fall 2003
Goals for Week 7: November 3-7, 2003

Negative Power Functions and Their Graphs: You should know what a negative power function is. You should know the shapes of the graphs of negative power functions $f(x) = x^{-n}$, and how they vary depending on whether n is even or odd and as n increases or decreases.

Properties of Negative Power Functions: You should know the domains of negative power functions and how to read and write that domain using set notation. You should know that negative power functions, and functions in general, do not have derivatives where they are not defined. You should know that $f(x) = x^{-n}$ is an even function when n is even and is an odd function when n is odd. You should be able to use the definitions of even and odd functions to derive the evenness and oddness of negative power functions. You should know the horizontal asymptotes of negative power functions and how to describe them using limit notation. You should know what a vertical asymptote is and how to write them down in limit notation. You should know what the left and right vertical asymptotes of $f(x) = x^{-n}$ are and how they vary based on whether n is even or odd.

Differentiating Negative Power Functions: You should know the formula for differentiating negative power functions, and how it relates to the formula for differentiating positive power functions. Given a function which is the composition of a negative power function after some differentiable function, you should be able to find the domain of the composition and differentiate the composition on its domain using the Chain Rule and the formula for differentiating negative power functions.

The Quotient Rule: You should know the statement of the quotient rule. You should be aware of how to derive the quotient rule from the product rule and the Chain Rule. You should know how to find the domain of a function which is the quotient of two other functions. You should be able to apply the quotient rule when given a function which is clearly the quotient of two other functions.

The Other Trigonometric Functions: You should know the definitions of tangent, cotangent, secant, and cosecant in terms of quotients of sine and cosine. You should know the functional notation for these four trigonometric functions (that is, tangent is $\tan x$, secant is $\sec x$, etc.). You should know the shapes of the graphs of these four functions. You should know their domains, their ranges, their periods, their left and right vertical asymptotes, and whether they are even or odd.

Derivatives of Trigonometric Functions: You should either know the formulae for the derivatives of tangent, cotangent, secant, and cosecant, or know how to derive those formulae reasonably quickly using the quotient rule and the Chain Rule. You should have incorporated these formulae for taking the derivatives of trigonometric functions into your general ability to take the derivatives of functions using the rule of differentiation you have learned thus far.

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Lecture Notes for Week 7: Lectures 16 and Lecture 17

Homework for Week 7: Homework 13 and Homework 14