Math 120 Homework 8

• Due Friday Nov 17 at start of class.

• If your homework is longer than one page, staple the pages together, and put your name on each sheet of paper. Homework that is not stapled will loose 1 point.

• Each homework problem should be correct as stated. Occasionally, however, I might screw something up and give you an impossible homework problem. If you believe a problem is incorrect, please email me. If you are right, the first person to point out an error will get +1 on that homework, and I will post an updated version.

Hyperbolic and inverse trigometric functions

1. Compute the derivative of \( f(x) = \arccos \frac{x}{\sqrt{x^2 - 1}} \). What is the domain of \( f(x) \)?

2. Prove that \( \sinh(x + y) = \sinh(x) \cosh(y) + \cosh(x) \sinh(y) \) and \( \cosh(x + y) = \cosh(x) \cosh(y) + \sinh(x) \sinh(y) \).

3. Graph the function \( f(x) = \arctan(\tan(x)) \) for all \( x \) in \( D(f) \cap [-2\pi, 2\pi] \). You do not need to prove that your graph is correct, but draw it carefully—mark your \( x \) and \( y \) axes, scale things properly, and be sure to get the domain correct.

Implicit differentiation

4. At which points on the ellipse \( x^2 + 3y^2 = 1 \) is the tangent line parallel to the line \( y = x \)? Prove that your answer is correct.

5. Compute the slope of the tangent line of the curve \( y^5 + 2xy^3 + 3x^2y + 10x = 16 \) at the point \( (1, 1) \).