

### MATH 1101 HOMEWORK 3

Due 5:00 PM Apr 25, 2006

1. Prove that a function  $f : S \rightarrow T$  has an inverse if and only if  $f$  is both one-to-one and onto.  
(Don't assume  $S = \mathbb{R}$  or  $T = \mathbb{R}$ .)
2. Carefully state and prove the Sandwich Theorem.
3. Carefully state and prove the Product Rule.
4. Carefully state and prove the Chain Rule.
5. Use the definition of the derivative to prove
  - (a)  $\frac{d}{dx}x^n = nx^{n-1}$  for  $n$  positive integer.
  - (b)  $\frac{d}{dx}\cos(x) = -\sin(x)$