

# Math 1A Worksheet 15

March 7th, 2008

1. Sketch the graphs of the functions  $x^2$  and  $2^x$ . How many times do the graphs intersect? Find at least one of these points of intersection. Which function is growing the most quickly? How can you tell?
2. Let  $f(x) = 8x^3 + 2x + 2 + \cos x$ . Find  $f^{-1}(3)$  and  $f^{-1}(-\pi^3 - \pi + 2)$ .
3. Let  $g(x) = x + \ln x$ . For which  $x$  do we have  $-1 < g^{-1}(x) \leq 3$ ? (Be careful; this is an easy one to get backwards, and the whole point of this problem is to think hard about inverse functions!)
4. Oftentimes a function is *not* one-to-one, but we can restrict the domain of the function to make it one-to-one and define an inverse to this restricted function. We have seen an example:  $\sqrt{x}$  is the inverse of  $x^2$  *restricted to*  $[0, \infty)$ . Let's look at another good example:
  - a) The function  $\sin x$  is *not* one-to-one. How can we restrict its domain to get a function which is one-to-one?
  - b) Explain how we use part a) to define the well-known function  $\sin^{-1}(x)$ .