

Math 1A Worksheet 14

October 5th, 2007

1. Is the function $f(x) = x + \sin x$ one-to-one? [Hint: look at $f'(x)$.]
2. a) Suppose $f(x)$ is an invertible function and (a, b) lies on the graph of f . What point must lie on the graph of $y = f^{-1}(x)$?
b) Graph the function $f(x) = x^3$ and its inverse on the same axes. Which line do you reflect the graph of f across to get the graph of f^{-1} ?
c) What do you know about the points where the graphs of f and f^{-1} intersect?
3. Recall that $e = \lim_{h \rightarrow 0} (1 + h)^{\frac{1}{h}}$. Use this to show that

$$\lim_{h \rightarrow 0} \frac{e^h - 1}{h} = 1.$$

Now use the limit definition of the derivative to show that $\frac{d}{dx} e^x = e^x$.

4. Use the previous problem to find the derivative of $g(x) = 2^x$.