

Math 1A Worksheet 16

October 10th, 2007

1. Let $f(x) = x + \ln x$. Find $(f^{-1})'(1)$.
2. Find $\frac{d^{100}}{dx^{100}} x e^{-x}$.
3. Find all x satisfying the following equations/inequalities:
 - a) $\ln(x-1) - \ln x = 1$,
 - b) $\ln(x^2 - 2x - 2) \leq 0$.
4. Let f be a nonzero invertible function.
 - a) Show that $\frac{1}{f}$ is also a nonzero invertible function.
 - b) Is it true that $\left(\frac{1}{f}\right)^{-1} = \frac{1}{f^{-1}}$? (Here -1 indicates the inverse **function**, not the multiplicative inverse). [Hint: test some functions. I suggest testing $f(x) = e^x$.]
5. (Berkeley Prelim, Spring '84) Which is larger, π^3 or 3^π ? [Hint: there are many different ways to do this, but all involve comparing the functions x^3 and 3^x .]