Assignment #2 **Name** _____

23 January 2015

1. Following our proofs from class, prove the following identities:
   (a) $\ln(x^p) = p\ln(x)$ for p rational and $x > 0$.

   (b) $e^{b-a} = e^b/e^a$ for real numbers a and b.

2. Evaluate the integrals:
   (a) $\int xe^{-x^2}dx$

   (b) $\int_e^{e^5} \frac{1}{x\ln(x)}dx$

3. Let $y = \dfrac{x^3\sqrt{x^2+4}}{(x^4+16)^4}$. Use logarithmic differentiation to find y'.

4. Let $f(x) = e^x - e^{-x}$. Show that f is one-to-one and evaluate $(f^{-1})'(0)$.

5. Let $f(x) = x^2e^{-x}$. Find the intervals on which f is increasing; find the intervals on which f is decreasing; find and classify the local extreme values of f.