

Homework Due on February 24, 2015

1. For this problem you may use any of the results in the previous homework (whether you proved it or not).
 - (a) Prove if $n \in \mathbb{N}$ and $a > 0$ then prove $\ln(a^n) = n \ln(a)$.
 - (b) Prove that if $a > 0$ then $\ln\left(\frac{1}{a}\right) = -\ln(a)$.
 - (c) Prove $\ln((0, \infty)) = \mathbb{R}$ and thus the domain of $\exp(x)$ is \mathbb{R} .
 - (d) Suppose $m \in \mathbb{N}$ and $a > 0$, prove $\ln(\sqrt[m]{a}) = \frac{\ln(a)}{m}$.
 - (e) Let $n \in \mathbb{N}$ and define $e = \exp(1)$ prove $\exp(n) = e^n$.
 - (f) Show $e \geq 2$.
 - (g) Prove the derivative of $\exp(x)$ is $\exp(x)$.
2.
 - (a) Find $\int_1^3 x^2 \exp(x)$.
 - (b) Find $\int_1^3 \ln(x)$.