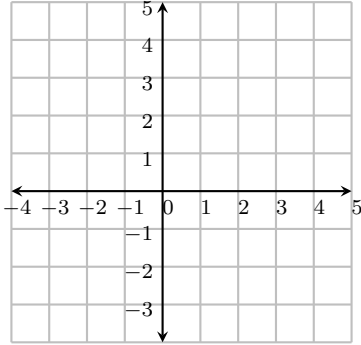

Exponents and Logarithms Diagnostic Quiz

Take this quiz to see if you need Lectures 5A, 5B, 5C (Exponents and Logarithms). Answers on page 2.

Important: Pencil or pen only. **No calculators.**

1. State the inverse of the function $f(x) = e^x$.
2. Sketch the graphs of $y = e^x$ and $y = \ln(x)$.

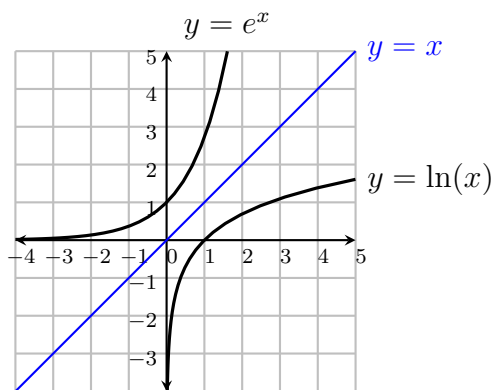


3. Write as a single logarithm: $\ln(x^3) - \frac{1}{2}\ln(x+2)$
4. $\log_2(\sqrt{2}) =$
5. $\ln(1/e) =$
6. $\ln(1) =$
7. Find the inverse of $f(x) = 2 + \ln(x - 3)$.

Here are the solutions. If your answers are not all correct, then you probably need Lectures 5ABC.

1. State the inverse of the function $f(x) = e^x$. Inverse is $\boxed{\ln(x)}$.

2. Sketch the graphs of $y = e^x$ and $y = \ln(x)$.



3. Write as a single logarithm: $\ln(x^3) - \frac{1}{2}\ln(x+2)$

$$\begin{aligned}\ln(x^3) - \frac{1}{2}\ln(x+2) &= \ln(x^3) - \ln((x+2)^{1/2}) \\ &= \ln(x^3) - \ln(\sqrt{x+2}) \\ &= \boxed{\ln\left(\frac{x^3}{\sqrt{x+2}}\right)}\end{aligned}$$

4. $\log_2(\sqrt{2}) = \boxed{\frac{1}{2}}$

5. $\ln(1/e) = \boxed{-1}$

6. $\ln(1) = \boxed{0}$

7. Find the inverse of $f(x) = 2 + \ln(x - 3)$.

$$\begin{aligned}y &= 2 + \ln(x - 3) \\ x &= 2 + \ln(y - 3) && \text{(interchange variables)} \\ x - 2 &= \ln(y - 3) && \text{(solve for } y\text{)} \\ e^{x-2} &= e^{\ln(y-3)} \\ e^{x-2} &= y - 3 \\ e^{x-2} &= e^{\ln(y-3)} \\ 3 + e^{x-2} &= y\end{aligned}$$

Therefore $\boxed{f^{-1}(x) = 3 + e^{x-2}}$.