Sec 3.2 Logarithmic Functions

A. Limit Rules

1. $\lim_{x\to 0^+} \ln(x) = -\infty$
2. $\lim_{x\to \infty} \ln(x) = \infty$
3. $\lim_{x\to 0^+} \log(x) = -\infty$
4. $\lim_{x\to \infty} \log(x) = \infty$

$$\left(f^{-1}\right)'(a) = \frac{1}{f'\left(f^{-1}(a)\right)}$$

Examples:

1. $\lim_{x\to 3^+} \log\left(x^2 - 5x + 6\right) =$

2. $\lim_{x\to 0^+} \log(\sin x) =$

3. $\lim_{x\to \infty} \left[\log\left(1 + x^2\right) - \log(1 + x)\right] =$

4. If f is one-to-one and $f(3)=11$, then

a.) $f^{-1}(11)=$

b.) $[f(3)]^{-1}=$

5. Find the inverse for each of the following:

a.) $f(x)=\dfrac{4x-12}{19x+15}$

b.) $h(x)=e^{9x+3}$

c.) $f(x)=\ln(13x+10)$

6. For $f(x)=x^3+4x+4$, find $\left(f^{-1}\right)'(4)=$

7. Suppose f^{-1} is the inverse function of a differentiable function f and $f(3)=4$, $f'(3)=\frac{7}{4}$ then $\left(f^{-1}\right)'(4)=$

8. If $\ln(a)=2$, $\ln(b)=3$, and $\ln(c)=5$, evaluate $\ln\left(\sqrt{b^{-4}c^{-4}a^{-3}}\right)=$

9. Solve each equation for x:

a.) $3^{x-4}=9$

b.) $\ln(x)+\ln(x-1)=4$