New Derivative Rules:

$\log_e x = \ln x \qquad \log_{10} x = \log x$

1) $\frac{d}{dx}\ln u = \frac{u'}{u}$

2) $\frac{d}{dx}\log_a u = \frac{1}{\ln a}\cdot\frac{u'}{u}$

3) $\frac{d}{dx}e^u = e^u \cdot u'$

4) $\frac{d}{dx}a^u = \ln a \cdot a^u \cdot u'$

log properties:

$\ln(ab) = \ln a + \ln b$

$\ln\left(\frac{a}{b}\right) = \ln a - \ln b$

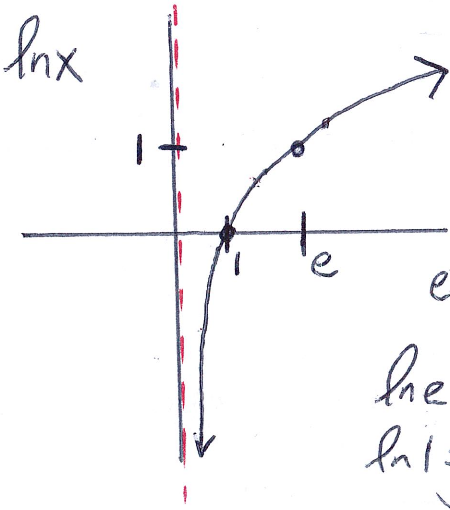
$\ln a^n = n\cdot\ln a$

$\log_a(cd) = \log_a c + \log_a d$

$\log_a\left(\frac{c}{d}\right) = \log_a c - \log_a d$

$\log_a c^n = n\cdot\log_a c$

$y = \ln x$



$e \approx 2.718$

$\ln e = 1$

$\ln 1 = 0$

$\ln\left(\frac{1}{2}\right) =$

$\ln(2) =$

$\ln(3) =$

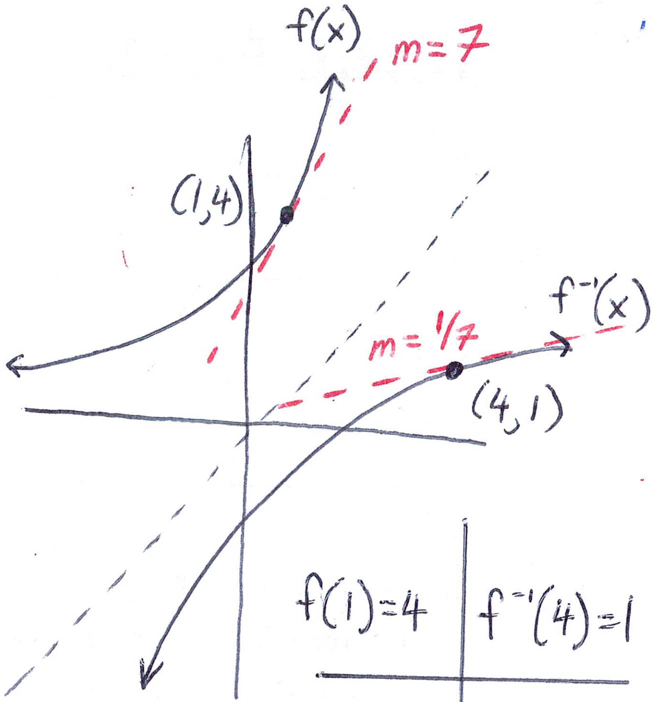
$\ln(ab) = \ln a + \ln b$

$\ln\left(\frac{a}{b}\right) = \ln a - \ln b$

$\ln a^n = n\ln a$

$\cancel{\ln(a+b) \neq \ln a + \ln b}$

$\boxed{\frac{d}{dx}\ln u = \frac{u'}{u}}$



$f(1)=4$	$f^{-1}(4)=1$
$f'(1)=7$	$(f^{-1})'(4)=\frac{1}{7}$

Steps: Derivative of Inverse at a Point

1) The y-value of function is given
2) set function equal to y-value
3) Solve for x: guess and check
   * test values close to 0.
4) find derivative of function
5) Use the x-value to evaluate derivative to find slope
6) Derivative of the inverse at its corresponding point is the reciprocal of slope.

To determine Increasing/Decreasing speed, compare signs between $v(t)$ and $a(t)$

* Increasing speed if $v(t)$ and $a(t)$ have same signs
* Decreasing speed if $v(t)$ and $a(t)$ have opposite signs.

To determine increasing or decreasing velocity, look at sign of $a(t)$

* If $a(t) > 0$, velocity is increasing
* If $a(t) < 0$, velocity is decreasing