Examples) Solve for x.

1) $2^{x+1} = 8$ 2) $3^{2x-3} = \frac{1}{3}$

$2^{x+1} = 2^3$ $3^{2x-3} = 3^{-1}$
$x+1 = 3$ $2x-3 = -1$
$\boxed{x=2}$ $\boxed{x=1}$

Examples: find the value of the following

1) $\log_2 8$ = ?   2) $\log_5 \frac{1}{25}$ 3) $\log_4 \sqrt{2}$

$2^x = 8$ (-2) $4^x = 2^{1/2}$
$\log_2 8 = 3$ $2^{2x} = 2^{1/2}$
                     $2x = \frac{1}{2}$
                     $x = \frac{1}{4}$

Solve each equation in terms of x.

43. $\log_3(2x-2) = 2$

Rewrite exponential form.

$3^2 = 2x - 2$
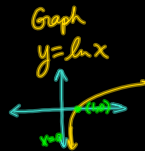$x = \frac{11}{2}$

Examples) Find the value of the following

11) $\ln e^4$ 12) $9 \ln 1$ 13) $8 \ln \sqrt{e}$

(4) (0) $8 \cdot \ln e^{1/2}$
                $8 \cdot \frac{1}{2}$
                (4)

Examples) Find the value of the following expressions:

12) $\log 25 + \log 4$ 12) $\log_2 40 - \log_2 5$ 13) $\log 10^{35}$

$\log 100$ $\log_2 8$ $35 \log 10$
(2) (3) (35)

Examples) Find the value of the following:

6) $\log 100$ 7) $\log 1$ 8) $5 \log \sqrt{10}$

(2) (0) $5 \cdot \log 10^{1/2}$
                $5 \cdot \frac{1}{2}$
                $(5/2)$

Graph
$y = e^x$

Graph
$y = \ln x$

$\frac{dy}{dx} = e^x$

$\frac{d}{dx}[e^u] = e^u \cdot u'$

Ex. find $f'(x)$
$f(x) = e^{3x-1}$
$f'(x) = 3 \cdot e^{3x-1}$

Ex. $g(x) = e^{-x}$
$g'(x) = -1 \cdot e^{-x} = \frac{-1}{e^x}$

Derive the derivative of $\ln x$.

Start $y = \ln x$

Rewrite in exponential form. $e^y = x$

Now take derivative → use implicit.

$e^y \cdot y' = 1$

Solve for y'

$y' = \frac{1}{e^y}$

Substitute

$\boxed{y' = \frac{1}{x}}$

$\frac{d}{dx}[\ln x] = \frac{1}{x}$

$\frac{d}{dx}[\ln u] = \frac{u'}{u}$

Ex. Find $f'(x)$ if $f(x) = \ln(x^2)$
$f'(x) = \frac{2x}{x^2} = \frac{2}{x}$

Ex. find $g'(x)$ of $g(x) = \ln(\sin x)$.
$g'(x) = \frac{\cos x}{\sin x} = \cot x$

HW from textbook:
p. 320: 37-73 every other odd
p. 347: 37-61 e.o.o. , 65, 73

$\sqrt{-1} \quad 2^3 \quad \sum \quad \pi$

$\sqrt{-1}$

12-4: How do I find the derivatives of exponential and logarithmic functions?