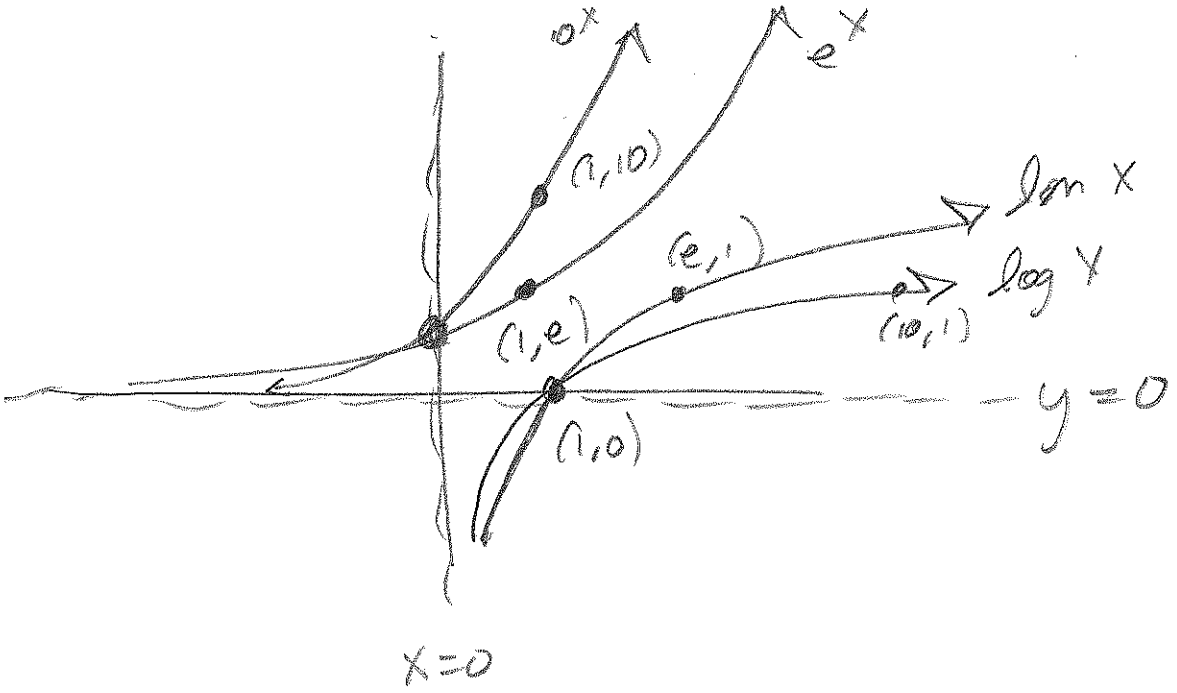
202 §6.3 I #s 22, 23, 27, 28, 30, 35, 37, 39, 42

#s 20-22 Use Formula 7 (whatever) to graph the following on a common screen.

Formula 7, so you can get it to graph

$$\log_4 x = \frac{\ln(x)}{\ln(4)} = \frac{1}{\ln(4)} \ln(x)$$

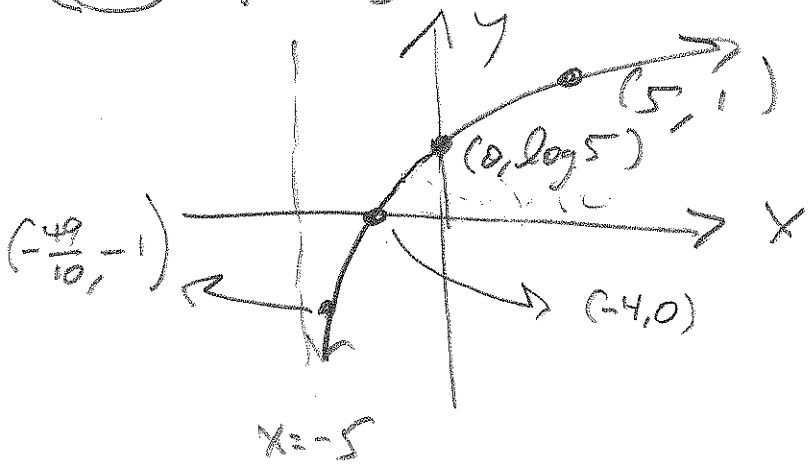
(22) $y = \ln x$, $y = \log x$, $y = e^x$, $y = 10^x$



#s 23-4 Make rough sketch. No Calculator

(23) (a) $y = \log(x+5)$

$-5\frac{1}{10} = -\frac{49}{10}$



202 §6.3 I #s 27, 28, 30, 35, 37, 39, 42

~~27~~ #s 27-36 solve for x.

27 (a) $e^{7-4x} = 6$

$7 - 4x = \ln 6$

$-4x = \ln 6 - 7$

$$x = \frac{\ln 6 - 7}{-4}$$

(b) $\ln(3x-10) = 2$

$3x - 10 = e^2$

$3x = e^2 + 10$

$$x = \frac{e^2 + 10}{3}$$

28 (a) $\ln(x^2 - 1) = 3$

$x^2 - 1 = e^3$

$x^2 = e^3 + 1$

$$x = \pm\sqrt{e^3 + 1}$$

(b) $e^{2x} - 3e^x + 2 = 0$

$u^2 - 3u + 2 = 0$

$(u-2)(u-1) = 0$

$u = 2$ OR $u = 1$

$e^x = 2$ OR $e^x = 1$

$x = \ln 2$ $x = \ln 1$ $x = 0$

$$x \in \{0, \ln 2\}$$

30 (a) $e^{3x+1} = k$

$3x + 1 = \ln k$

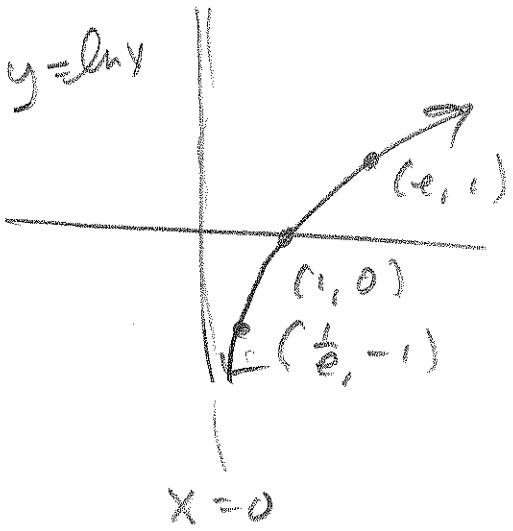
$3x = \ln k - 1$

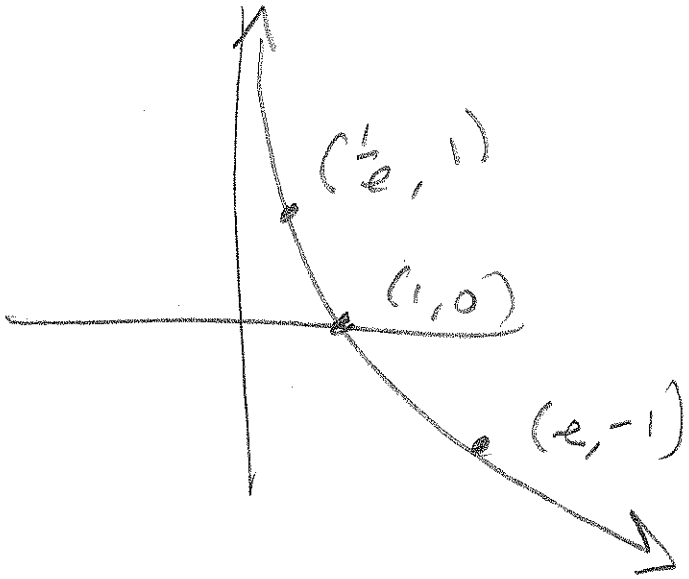
$$x = \frac{\ln k - 1}{3}$$

$$x \in \left\{\frac{\ln k - 1}{3}\right\}$$

202 § 6.3 #s 23, 27, 28, 30, 35, 37, 39, 42

(23) (b) $y = -\ln x$





#s 27-36 Solve for x

(27) (a) $e^{7-4x} = 6$

$7 - 4x = \ln 6$

$-4x = \ln 6 - 7$

$x = \frac{\ln 6 - 7}{-4}$ or $\frac{7 - \ln 6}{4}$

(b) $\ln(3x - 10) = 2$

$3x - 10 = e^2$

$3x = e^2 + 10$

$\boxed{x = \frac{e^2 + 10}{3}}$

(28) (a) $\ln(x^2 - 1) = 3$

$x^2 - 1 = e^3$

$x^2 = e^3 + 1$

$\boxed{x = \pm\sqrt{e^3 + 1}}$

(b) $e^{2x} - 3e^x + 2 = 0$

$u^2 - 3u + 2 = 0$ ($u = e^x$, $u^2 = e^{2x}$)

$(u - 1)(u - 2) = 0$

$u = 1$ $\quad u = 2$

$e^x = 1$ $\quad e^x = 2$

$x = \ln(1) = 0$ $\quad x = \ln 2$

$x \in \{0, \ln 2\}$

202 §6.5 #s 30, 35, 37, 42

(30) (a) $\ln(\ln x) = 1$

$e^{\ln(\ln x)} = e^1$

$\ln x = e$

$\boxed{x = e^e}$

(b) $\log_2(mx) = c$

$mx = 2^c$

$\boxed{x = \frac{2^c}{m}}$ or $\frac{1}{m} \cdot 2^c$

(35) $e^{2x} - e^x - 6 = 0$

$u^2 - u - 6 = 0$

$(u-3)(u+1) = 0$

$u = 3 \qquad u = -1$

$e^x = 3 \qquad e^x = -1$ ✗

$\boxed{x = \ln 3}$

(37) Find Soln to 4 decimal places

(a) $e^{5x+2} = 100$

$5x + 2 = \ln(100)$

$5x = \ln(100) - 2$

$x = \frac{\ln(100) - 2}{5}$

$\boxed{x \approx .5210}$

(b) $\ln(e^x - 2) = 3$

$e^x - 2 = e^3$

$e^x = e^3 + 2$

$x = \ln(e^3 + 2)$

$\boxed{x \approx 3.0949}$

6.3 I #42

(42) Velocity of particle is

$v(t) = ce^{-kt}$ where $c, k > 0$ are constants.

(a) Show that acceleration is proportional to velocity.

$v(t) = ce^{-kt} \longrightarrow$

$v'(t) = \text{acceleration} = -kce^{-kt} = a(t)$

and $\dfrac{v(t)}{a(t)} = \boxed{\dfrac{ce^{-kt}}{-cke^{-kt}} = -\dfrac{1}{k} \text{ is constant}}$

$\longrightarrow$ proportional.

(b) The # c is the initial velocity, since $ce^{-k\cdot 0} = ce^0 = c$!

(c) We find when velocity is $\frac{1}{2}$ the initial velocity:

$ce^{-kt} = \frac{1}{2}c$

$e^{-kt} = \frac{1}{2}$

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

$t = \dfrac{\ln\left(\frac{1}{2}\right)}{-k} = \dfrac{\ln(2)}{k}$

$\boxed{t = \dfrac{\ln(2)}{k}}$