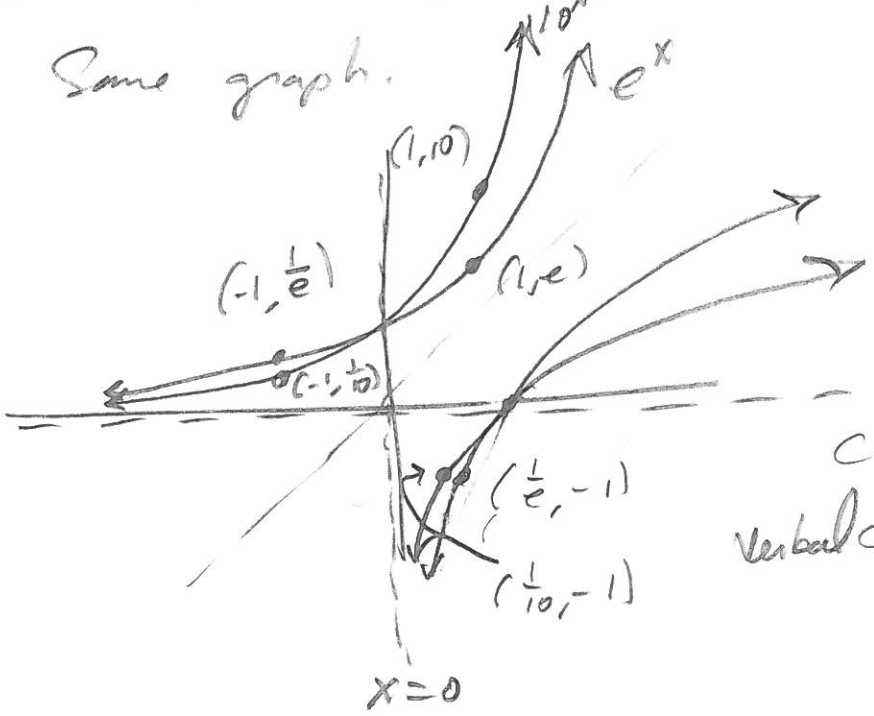
202 §6.3 I #s 22, 23, ~~27~~, 28, 30, 35, 37, 39, 42

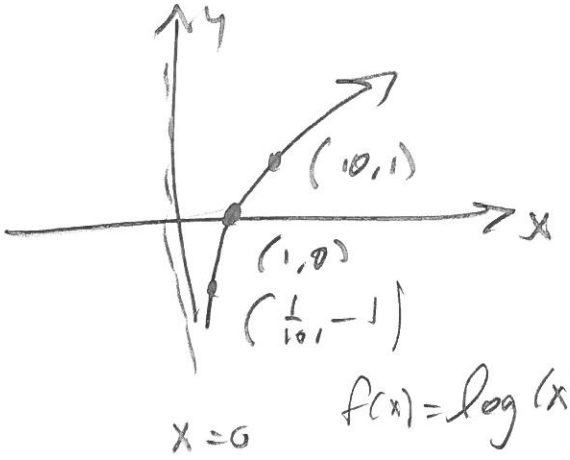
(22) Graph $\ln x$, $\log_{10} x$ & e^x, 10^x on same graph.

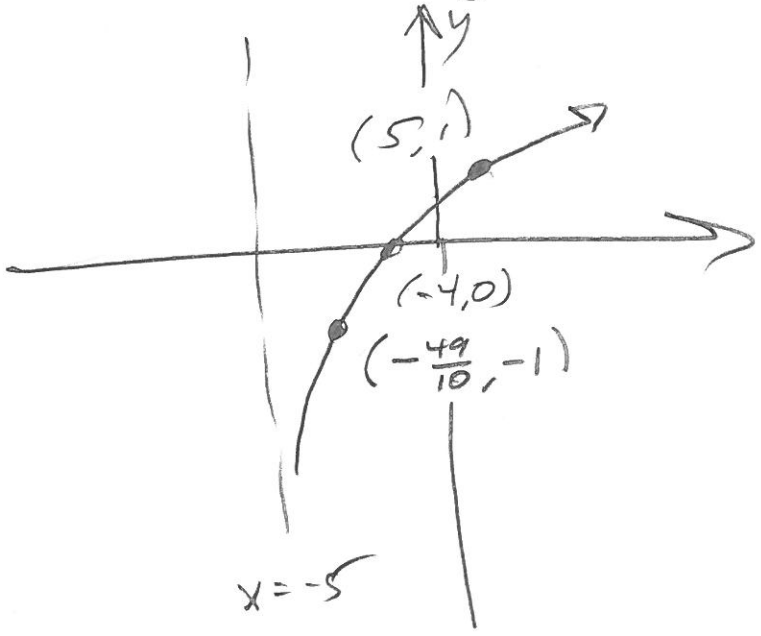


Check out Jesus's verbal descriptions.

(23) Sketch by transforming. $y = \log_{10}(x+5)$

$= \log(x+5)$

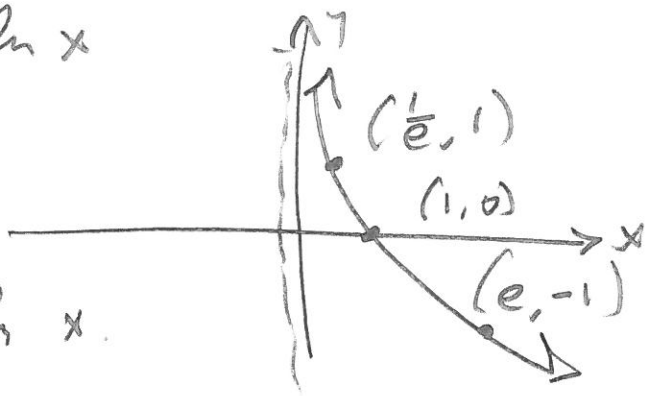




202 §6.3 I #s 27, 28, 30, 35, 37, 39, 42

~~27~~

23b $y = -\ln x$



#s27-36 Solve for x.

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

$7 - 4x = \ln 6$

$-4x = \ln 6 - 7$

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

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

$3x - 10 = e^2$

$3x = e^2 + 10$

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

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

$x^2 - 1 = e^3$

$x^2 - 1 + e^3 = 0$

$x^2 = e^3 + 1$

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

28b) $e^{2x} - 3e^x + 2 = 0$

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

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

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

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

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

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

202 §6.3 I #s 30, 35, 37, 39, 42

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

$3x+1 = \ln(k)$

$3x = \ln(k) - 1$

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

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

$mx = 2^c$

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

OR $\frac{2^c}{m}$

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

$u^2 - u - 6 = 0$

$(u-3)(u+2) = 0$

$u = 3$ | $u = -2$

$e^x = 3$ | $e^x = -2$ ~~✗~~

$x = \ln(3)$

#s 37-8 Find Solⁿ, correct to 4 decimal places.

(37) (a) $\ln(1+x^3) - 4 = 0$

$\ln(x^3+1) = 4$

$x^3 + 1 = e^4$

$x^3 = e^4 - 1$

$x = \sqrt[3]{e^4 - 1}$ ≈

$x \approx 3.7704$

(b) $2e^{\frac{1}{x}} = 42$

$e^{\frac{1}{x}} = 21$

$\frac{1}{x} = \ln(21)$

$$x = \frac{1}{\ln(21)} \approx .3285$$

202 §6.3I #s 39, 42

(39) Solve for x:

(a) $\ln(x) < 0$ — $\ln(x)$ is increasing, so Left < Right → $\ln(\text{Left}) < \ln(\text{Right})$

$x < e^0 = 1$

$\boxed{x \in (0, 1)}$

(b) $e^x > 5$

$x > \ln(5)$

$\boxed{x \in (\ln(5), \infty)}$

(42) Velocity $= v = v(t) = ce^{-kt}$ →

(a) Velocity is proportional to acceleration,

since $a(t) = v'(t) = -kce^{-kt}$ so

$\boxed{a(t) = -k\,v(t)}$ See? Proportional!

(b) c = initial velocity $c = ce^{-0} = c$.

(c) When is $v(t) = \frac{1}{2}v(0) = \frac{1}{2}c$?

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

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

$-kt = \ln(1/2)$

$t = \frac{-\ln(2)}{-k}$ = $\boxed{\frac{1}{k}\ln(2) = t}$