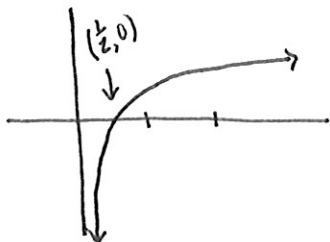


hw solutions section 5.2

4. Put in log form: $5^{-3} = \frac{1}{125}$
 $\log_5 \left(\frac{1}{125} \right) = -3$

19. write as a single log:
 $\ln 3 + \frac{1}{2} \ln x + \ln y - \frac{1}{3} \ln z$
 $\ln 3 + \ln \sqrt{x} + \ln y - \ln \sqrt[3]{z}$
 $= \ln \left(\frac{3y\sqrt{x}}{\sqrt[3]{z}} \right)$

31. sketch the graph: $y = \ln(2x)$



40. Solve for t : $12 - e^{.4t} = 3$

$$9 = e^{.4t}$$

$$\ln 9 = \ln e^{.4t}$$

$$\ln 9 = .4t$$

$$t = \frac{\ln 9}{.4} = 5 \ln 3 = 5.49306$$

53. $f(t) = 200(1 - .956e^{-.18t})$

if $f(t) = 140$, find t .

$$140 = 200(1 - .956e^{-.18t})$$

$$.7 = 1 - .956e^{-.18t}$$

$$.956e^{-.18t} = .3$$

$$e^{-.18t} = .3138075$$

$$-.18t = \ln(.3138075)$$

$$-.18t = -1.158975$$

$$t = 6.43875$$

the fish is almost

6 1/2 yrs old

17. write as a single log: $2 \ln a + 3 \ln b$
 $\ln(a^2 b^3)$

28. expand: $\ln \left[\frac{x^2}{\sqrt{x}(1+x)^2} \right]$

$$\ln x^2 - \ln \sqrt{x} - \ln(1+x)^2$$

$$2 \ln x - \frac{1}{2} \ln x - 2 \ln(1+x)$$

$$\frac{3}{2} \ln x - 2 \ln(1+x)$$

38. solve for t : $4e^{t-1} = 4$

$$e^{t-1} = 1$$

$$\ln e^{t-1} = \ln 1$$

$$t-1 = 0$$

$$t = 1$$

45. $f(x) = a + b \ln x$, $f(1) = 2$, $f(2) = 4$
 find f .

$$f(1) = a + b \ln(1) = a = 2$$

$$f(2) = a + b \ln(2)$$

$$2 + b \ln 2 = 4$$

$$b \ln 2 = 2$$

$$b = \frac{2}{\ln 2} = 2.88539$$

$$f(x) = 2 + \frac{2 \ln x}{\ln 2}$$

56. $T = T_0 + (T_1 - T_0)(.97)^t$

$$T_0 = 70, T_1 = 98.6, T = 80, t = \text{hrs dead}$$

$$80 = 70 + (98.6 - 70)(.97)^t$$

$$10 = (28.6)(.97)^t$$

$$.34965 = (.97)^t$$

$$\ln(.34965) = t \ln(.97)$$

$$\frac{\ln(.34965)}{\ln(.97)} = t$$

$$\ln(.97)$$

$$t = 34.4993$$

he's been dead for around 34.5 hrs