MAC 1105 PRACTICE EXAM V (65 pts.)

① Write $\log_b a = c$ in exponential form and $9^{1/2} = 3$ in logarithmic form.

② Let $y = \ln(x+3)$

a) Find domain and y intercept

b) Find the x intercept.

③ Sketch $y = \log_3 x$.

Hint: Consider the graph of $y = 3^x$.

④ The risk R (given as a percent) of an accident is $R = 6e^{kx}$ where x is the concentration of alcohol in the blood, and k is constant. If $R = 12$ when the concentration is 0.04, solve for k.

⑤a) Write $\log_b \left[\frac{x^2\sqrt{y}}{3x}\right]$ in terms of simpler logarithms without exponents or radicals.

b) Find the value of $\log_8 37$ to 2 decimal places.

⑥a) Solve $M = \log\left(\frac{x}{x_0}\right)$ for x_0.

b) Solve $\log(6x) = 0.3031$ correct to 2 dec. places.

c) Solve $4^x = 3^{(2x-1)}$ to 2 dec. places, Show work.

d) Solve $A = A_0 \cdot 2^{-t/h}$ for h.

⑦a) Suppose $3,000 is invested at 8% compounded continuously. How much money will be in the account after 3 years?

b) How long will it take money to double, if it is compounded monthly at 7%. Round up to the next month.

MAC 1105 PRAC. EXAM II KEY

① $b^c = a$, $\log_9 3 = \frac{1}{2}$

② a) domain: $x+3>0 \Rightarrow x>-3$

y int.: $\ln 3 \approx 1.099$

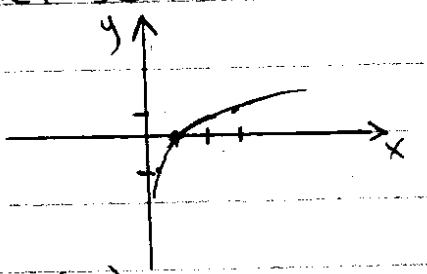
b) $\ln(x+3)=0$

$e^0 = x+3 \Rightarrow x=-2$

③ $y=3^x$

x	y
−2	$\frac{1}{9}$
−1	$\frac{1}{3}$
0	1
1	3
2	9

Reverse the table.



④ $12 = 6e^{k(.04)}$

$2 = e^{.04k}$

$\ln 2 = .04k$

$k = \frac{\ln 2}{.04} \approx 17.33$

⑤ a) $\log_b x^2 y^{1/2} - \log_b 3x$

$= 2\log_b x + \frac{1}{2}\log_b y - \log_b 3 - \log_b x$

b) $\frac{\log 37}{\log 8} \approx 1.74$

⑥ a) $10^M = \frac{x}{x_0} \Rightarrow x_0 = \frac{x}{10^M}$

OR $x_0 = x \cdot 10^{-M}$

b) $10^{.3031} = 6x$

$x \approx .33$

⑥ c) $4^x = 3^{(2x-1)}$

$\log 4^x = \log 3^{(2x-1)}$

$x \log 4 = (2x-1)\log 3$

$x\log 4 = x(2\log 3) - \log 3$

$\log 3 = x(2\log 3) - (\log 4)x$

$\log 3 = x[2\log 3 - \log 4]$

$\frac{\log 3}{2\log 3 - \log 4} = x \approx 1.35$

d) $\frac{A}{A_0} = 2^{-t/h}$

$\ln\left(\frac{A}{A_0}\right) = -\frac{t}{h}\ln 2$

$h = \frac{-t\ln 2}{\ln\left(\frac{A}{A_0}\right)}$

⑦ a) $A = Pe^{rt}$

$= 3{,}000\, e^{.08(3)}$

$= \$3813.75$

b) $2P = P\left(1+\frac{.07}{12}\right)^n$

$\ln 2 = n\ln\left(1+\frac{.07}{12}\right)$

$\frac{\ln 2}{\ln\left(1+\frac{.07}{12}\right)} \approx 120$ months