MAC 1105 (65 pts.) EXAM I MR. NADEL SUMMER 2009

① Write $y = \log_3 x$ in exponential form and $2^5 = 32$ in logarithmic form.

② Let $y = \log(x-2)$

a) Find its domain.

b) Find intercept(s), if any.

③ Sketch $y = \log_2 x$.

Hint: Consider the graph of $y = 2^x$.

④ $D = 5e^{-0.4h}$

gives the no. of milligrams D of a certain medication in a patient's bloodstream after h hrs. When the no. of milligrams reaches 3, the drug is given again. What is the time between administrations of the drug?

⑤a) Write

$$\ln x - 3\ln y + 2\ln z$$

as a single logarithm.

b) Find the value of

$$\log_7 45$$

to 2 decimal places.

⑥a) Solve $A = Pe^{rt}$ for r.

b) Solve $7^x = 6^{(x+7)}$ correct to 2 dec. places.

c) Solve for x:

$$\log(x-15) + \log x = 2.$$

d) Solve $pH = -\log[H^+]$ for $[H^+]$.

⑦a) Suppose $2500 is invested at 6% compounded quarterly. How much money will be in the account after 4 yrs?

b) How long will it take money to triple, if it is compounded continuously at 5%?

MAC 1105 EXAM II KEY (SU'09)

① $3^y = x$, $\log_2 32 = 5$

② a) $x - 2 > 0 \Rightarrow x > 2$

b) No y intercept

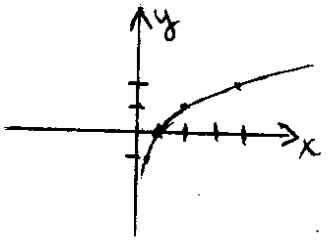
$\log(x-2) = 0$

$x - 2 = 10^0 = 1 \Rightarrow x = 3$

③

x	$y = 2^x$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4

Reverse table:



④ $D = 5e^{-0.4h}$

$3 = 5e^{-0.4h}$

$\frac{3}{5} = e^{-0.4h}$

$\ln .6 = -0.4h$

$\frac{\ln .6}{-0.4} = h \approx 1.28$ hrs

⑤a) $\ln x - \ln y^3 + \ln z^2$

$= \ln(xz^2) - \ln y^3$

$= \ln\left(\frac{xz^2}{y^3}\right)$

b) $\frac{\log 45}{\log 7} \approx 1.96$

⑥ a) $A = Pe^{rt}$

$\frac{A}{P} = e^{rt}$

$\ln\left(\frac{A}{P}\right) = rt$

$\frac{\ln\left(\frac{A}{P}\right)}{t} = r$

⑥b) $7^x = 6^{(x+7)}$

$\log 7^x = \log 6^{(x+7)}$

$x \log 7 = (x+7)\log 6$

$x \log 7 = x \log 6 + 7 \log 6$

$x \log 7 - x \log 6 = 7 \log 6$

$x(\log 7 - \log 6) = 7 \log 6$

$x = \frac{7 \log 6}{\log 7 - \log 6} \approx 81.36$

c) $\log_{10}[x(x-15)] = 2$

$x^2 - 15x = 100$

$x^2 - 15x - 100 = 0$

$(x-20)(x+5) = 0$

$x = 20, \cancel{-5}$ ← reject.

d) $pH = -\log[H^+]$

$\log_{10}[H^+] = -pH$

$10^{-pH} = [H^+]$

⑦ a) $A = P(1+i)^n$

$2500\left(1 + \frac{.06}{4}\right)^{16}$

$\approx \$3172.46$

b) $A = Pe^{rt}$

$3\cancel{P} = \cancel{P}e^{.05t}$

$\ln 3 = .05t$

$t = \frac{\ln 3}{.05} \approx 21.97$ years