Math 3 name: Key 2015

[redacted]1-2/1-3 Practice

1. You are planning to take out a loan to pay for part of your post high school education. You need $12,000 and are shopping banks for the best loan deal. You have found 3 options:

Bank A	9.75% compounded yearly
Bank B	9.5% compounded monthly
Bank C	9.4% compounded continuously

a. Determine how much (round to the nearest penny) you would owe at the end of 1 year at each bank.

Bank A

$A(1) = 12{,}000\left(1 + \frac{.0975}{1}\right)^{1 \cdot 1}$

$= \$13{,}170$

Bank B

$B(1) = 12{,}000\left(1 + \frac{.095}{12}\right)^{12 \cdot 1}$

$= \$13{,}190.97$

Bank C

$C(1) = 12{,}000e^{.094(1)}$

$= \$13{,}182.72$

b. Which bank will you choose for the best loan value?

Bank A - least amount to pay back.

2. Solve for x. **Show all work on a separate sheet of paper.**

a. $\log_x(6x+7) = 2$

b. $25^{x+2} = 125^{3x-6}$

c. $3(9^{x+1}) - 9 = 72$

d. $2^x = 30$

e. $\log_x 125 = \frac{3}{2}$

f. $\log_7(X) = 5$

g. $10^{(2x)} = 52$

h. $3(2^{x+4}) = 350$

i. $\log_3(5x + 2) = \log_3(4x + 8)$

j. $9^{x-2}\left(27^{x+3}\right)\left(81^{2x}\right) = \left(\frac{1}{3}\right)^{5x+8}$

k. $\frac{64}{4^{-6x}} = 2^{6x}$

3. Farmer Jill is bragging to Farmer John about the size of her farm. She tells him her farm is 9 times bigger than his farm. John's farm is $3^{6.25}$ acres. Jill's farm is $3^{8.25}$ acres.

Show two different ways to prove that Jill is correct.

1 $\frac{3^{8.25}}{3^{6.25}} = 3^2 = 9$

2 $\frac{3^{8.25}}{3^{6.25}} = \frac{8634.76}{959.42} = 8.9999 \approx 9$

2. (a) $\log_x(6x+7)=2$

$x^2=6x+7$

$x^2-6x-7=0$

$(x-7)(x+1)=0$

$x=7 \quad \cancel{x=-1}$

(b) $25^{x+2}=125^{3x-6}$

$5^{2(x+2)}=5^{3(3x-6)}$

$2x+4=9x-18$

$22=7x$

$\frac{22}{7}=x$

(c) $3(9^{x+1})-9=72$

$3(9^{x+1})=81$

$9^{x+1}=27$

$3^{2(x+1)}=3^3$

$2x+2=3$

$2x=1$

$x=\frac{1}{2}$

(d) $2^x=30$

$\log_2 30=x$

$4.907\approx x$

(e) $\log_x 125=\frac{3}{2}$

$x^{\frac{3}{2}}=125$

$(x^{\frac{3}{2}})^{\frac{2}{3}}=125^{\frac{2}{3}}$

$x=(125^{\frac{1}{3}})^2$

$x=25$

(f) $\log_7 x=5$

$7^5=x$

$16{,}807=x$

(g) $10^{2x}=52$

$\log_{10}52=2x$

$.858\approx x$

(h) $3(2^{x+4})=350$

$2^{x+4}=\frac{350}{3}$

$\log_2\frac{350}{3}=x+4$

$2.866\approx x$

(i) $2^{6+12x}=2^{6x}$

$6+12x=6x$

$6=-6x$

$-1=x$

(j) $9^{x-2}(27^{x+3})(81^{2x})=\frac{1}{3}^{5x+8}$

$3^{2(x-2)}\,3^{3(x+3)}\,3^{4(2x)}=3^{-1(5x+8)}$

$(2x-4)+(3x+9)+8x=-5x-8$

$13x+5=-5x-8$

$18x=-13$

$x=\frac{-13}{18}$

(k) $\frac{64}{4^{-6x}}=2^{6x}$

$\frac{2^6}{(2^2)^{-6x}}=2^{6x}$

$\frac{2^6}{2^{-12x}}=2^{6x}$

$2^{6+12x}=2^{6x}$

(l) $\log_3(5x+2)=\log_3(4x+8)$

$5x+2=4x+8$

$x=6$