Mth 111 Lab #5 (10 pts) NAME

This lab is intended to review some of the things we have done so far. You are encouraged to work together. As necessary, attach additional paper but <u>put your final answer on this paper</u>. Your work will be graded on completeness, neatness, accuracy and punctuality. You must show your work!

1) Solve for x: $15 - 5\,\dfrac{2x-4}{3} = 12 - \dfrac{5x-3}{2}$

2) (a) Use <u>your calculator</u> to solve $8 - x/4 = 5 \times e^{-x/5}$. Find <u>all</u> solutions to 3 significant digits.

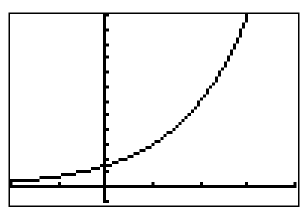
(b) Use <u>Algebra</u> to solve $2e^{3x+1} = 20$

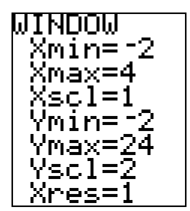
3) $f(x) = x^2 + 1$, Simplify $y = 4\,f(2x + 1) + 3$

4) Compute and simplify the difference quotient for $f(x) = 2x^2 + 5$

5a) Find the exponential function $y = a\,b^x$ whose graph is given. Use the given window settings to determine the y-intercept and the right end point. Use that to determine a & b. Test your answer by graphing.

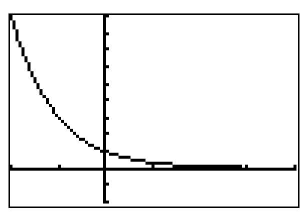
y =

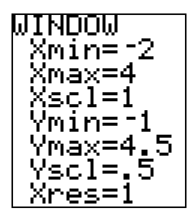




5b) Find the exponential function $y = a\,b^x$ whose graph is given. Use the given window settings to determine the y-intercept and the left end point. Use that to determine a & b. Test your answer by graphing.

y =





6) Find the equation of the form $y = A(b^x) + C$ given: an asymptote at $y = -3$, a y-intercept at $(0, 5)$ and $y(-3) = -2$.

7) Smalltown's population is given by $P(t) = 250(1.04)^t$ where t is the number of years since 2000.
(a) What was the initial population in 2000?

(b) What does $P(5) = 304$ mean?

(c) What was the population in 2007?

(d) When will the population reach 500. That is, solve $P(t) = 500$.

8) The population of Chub in Phish Lake is given by the "logistic model": $P(t) = \dfrac{1200}{1 + 11e^{-t/5}}$
Assume 't' is measured in years and the fish were introduced into the lake at $t = 0$.
(a) What does $P(0) = 100$ mean?

(b) Graph P(t) in $[0, 60] \times [0, 1200]$. Summarize the overall growth of the Chub population for $t > 50$.

9) Use the definition (not your calculator) to fill in the following tables.

(a)

x =	1	100	1000	0.001	1 billion
$\log_{10} x$					

(b)

x =	1	4	64	1/16	0.125
$\log_2 x$					

10) (a) Solve for x: $y = 2 + Ke^{ax + b}$

(b) Solve for x: $y = K \ln(mx + b) - 2$

BONUS
$P(t) = P_0e^{-kt}$ gives the amount of Naffzium after t minutes. Assume you start with 100 grams of Naffzium ($P_0 = 100$) and after 90 minutes you only have 60 grams left. To find the value for 'k' we must plug in the values we know and solve for k: $60 = 100e^{-k\,90}$
(a) Find 'k' <u>exactly</u> (not a decimal approximation) and store in 'K' K = $\boxed{}$

(b) Find the half-life of Naffzium? That is, using your recently determined value for 'k', solve

$\frac{1}{2} = e^{-k\,t}$. half-life ≈