**NEIU MATH177: Demo Exam 3**

Directions: Answer all of the questions. The problems will have their weights assigned next to them. Show all work for maximal credit. Good luck. No Books, Notes, Communications Devices, or Graphing Calculators. Scientific calculators are permitted. You have 100 minutes to complete the following questions. If needed, please use the back of this page. Good luck.

1) Do the following:
   a. Evaluate when z = -4: $-z^2$
   b. Write the solution set using interval notation: $\frac{4}{5}(x+1) \le x+1$
   c. Graph: $g(x) = \begin{cases} 3x-1, x \le 2 \\ -x, x > 2 \end{cases}$
   d. Graph the solution: $\begin{cases} y+2x \le 0 \\ 5x+3y \ge -2 \\ y \le 4 \end{cases}$
   e. Factor completely: $18x^4 + 21x^3 + 6x^2$
   f. Perform the indicated operation: $\frac{a}{a^2+10a+25} - \frac{4-a}{a^2+6a+5}$
   g. Simplify: $\left(\sqrt{x-1}+5\right)^2$
   h. Solve for y: $\frac{1}{2}y^{\,2} = y - \frac{1}{2}$
   i. Find the inverse of the following function: $f(x) = -\frac{1}{2}x + 2$
2) Graph the function. Be sure to label all roots, asymptotes, and the direction of the concavity: $f(x) = \frac{(x-2)(x+3)^2}{(x-1)(x+4)}$
3) Graph $f(x) = 3(x-1)^2 + 5$ using stretching and shifting. (show all stage graphs)
4) Suppose that you start with a 10 lb candy bar (Trader Joe's sells these). Every day you (and some friends) eat 10% of what is remaining. How much is left after 31 days?
5) Find the sum of $1 + x + x^2 + x^3 + \ldots + x^n$ for r=1.05 and n = 30.
6) Find the inverse function for $f(x) = 3^x - 8$
7) What is the expected approximate correlation (1, 0, or -1) between the following variables? Why?
   a. A car's speed and braking distance
   b. Number of TVs in home and fitness of occupants
   c. Income and number of cousins.
8) Provide the linear equation that passes through the points (4,1) and (-3, -5).
9) Convert $y' = 0.93x' + 0.42$ to each of the following. Use an appropriate substitution for x' and y'.
   a. Linear
   b. Exponential
   c. Logarithmic
   d. Power
10) Graph the following quadratic. Be sure to identify all solutions, the vertex, and the direction: $f(x) = -2x^2 + 3x - 8$