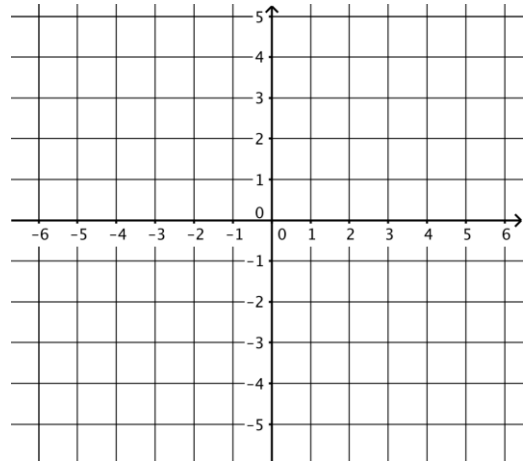# *No Calculator !*

1) The function $y = 8^x$ is stretched horizontally by a factor of 6, stretched vertically by a factor of 4 and then translated horizontally 2 units to the right. Write an expression for the new function in the form $y = ab^x$.

2) Simplify $\log_2(3) \times \log_3(5) \times \log_5(2)$

3) Sketch the graph of $y = \ln\left(\dfrac{1}{x+2}\right)$.

Indicate asymptotes and intercepts.

4)   Write as a single log:

   a) $2\ln(x-1) - \ln(x^2 - 3x + 2) + \ln(x-2)$

   b) $\log(1000) \times \log(xy^2) + \log(x)$

5) Given the log(25) = 1.3978 determine each of these:

   a) log(5)   b) log(1/25)   c) log(.000025)   d) log(6250)

6) Solve for x: $9^x - 10\left(3^x\right) + 3^2 = 0$

7) Write an exponential equation for the graph containing the points (2, 21) and (6, 189).   Simplify to the form $y = ab^x$

8) Solve the equations below (exact values, no calculators):

   a) $2^{2^x} = 256$ b) $x^{3/2} = 8^{5/2}$ c) $\log\left(x^2\right) = 4$

   d) $\log(x-5) + \log(x+10) = 2$ e) $\left(x^2 - 28\right)^{2/3} = 9$

9) Write a logistic function with an upper bound of 36, passing through the points (0, 12) and (1, 28).

10) Consider the functions $f(x) = e^x$ and $g(x) = x^2$. These functions can be composed in two ways: *f(g)* and *g(f)*.

a) Are the two compositions equivalent?

b) Can either (or both) of these be expressed as a simple *dilation* of *f(x)*? Be specific.

c) Can either (or both) of these be expressed as a simple *translation* of *f(x)*? Be specific.

d) Do either (or both) of these have an inverse function? If so, find it!

Calculator Okay for These!

11) A sample of radioactive isotope, which originally weighed 48 g, decayed to 41g in exactly 5 days.

a) Write a function modeling the weight of the isotope.

b) What will it weigh after 5 more days?

c) What is the half life of the isotope?

d) When will there be just 1 gram left? (use logs)

12) A glass of water at a temperature of 50° F is placed outside on a winter day when the temperature is just 8°. In 30 minutes the temperature of the water is 38°. How long will it take (from when it was initially placed outside) for the water to begin to freeze (32°)?

13) An interest rate of 7% compounded *continuously* is equivalent to what annual rate compounded *monthly*?