First Name:_____ Last Name: _____ Student ID: _____

Exponential and Logarithmic Functions (1)

1. Describe the transformations that can be applied to the function $y=2^x$ to obtain the graph of each functions. Rewrite the equation if necessary. Sketch the graph of the functions.

a. $y=\frac{1}{3}(2^{-x-2})$

b. $y=4^{\frac{1}{2}x}-3$

2. A mapping defined by $(x,y)\rightarrow(-x+3, \frac{1}{2}y-2)$ is applied to each point (x,y) on the graph of the function $y = 4^x$ to obtain the graph of $y = f(x)$.

a. Sketch the graph of $y = f(x)$ and identify its domain and range.
b. State the equation of $y = f(x)$.
c. What mapping must be applied to the points on $y = 2^x$ to obtain the same graph as $y = f(x)$?

3. Solve for *x*.

a. $\sqrt{8^{x+1}} = \frac{1}{32}$	e. $5^x(25)^{\frac{1}{x^2}} = 125$
b. $4^{3-5x} = 1$	f. $5(25)^x - 26(5^x) + 5 = 0$
c. $27^{x^2} = 3(9^{-x})$	g. $4^x + 5(2^x) + 6 = 0$
d. $(\frac{1}{4^x})^{x-4} = \frac{16^{x-3}}{2^x}$	h. $3^x - 6(\sqrt{3})^x - 27 = 0$

4. Cameron would like to invest $1000 for the next three and a half years. He is considering two different investment alternatives:

- Option 1: 3.2% per annum, compounded quarterly
- Option 2: 2.7% per annum, compounded monthly

Determine the amount of interest earned with each option.

5. Strontium-90, ^{90}Sr, has a half life of 29 years.

a. If 42.5 grams remain after 50 years, what is the initial mass of ^{90}Sr, to the nearest gram?
b. How long will it take for 180 grams of the substance to decay to 11.25 grams?

6. Solve the following system of equations.

$5^{2x+y} = 625$

$25^{x+2y} = \frac{1}{25}$

7. Determine all values of k for which the equation

$k(2^x) + 2^{-x} = 3$ has a single root.