Quiz 4

Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. Let $g(x) = \log_3(x)$

   (a) [1] (WebHW17 #18)
   Find $g(9)$.

   $\log_3(9) = \log_3(3^2) = 2$

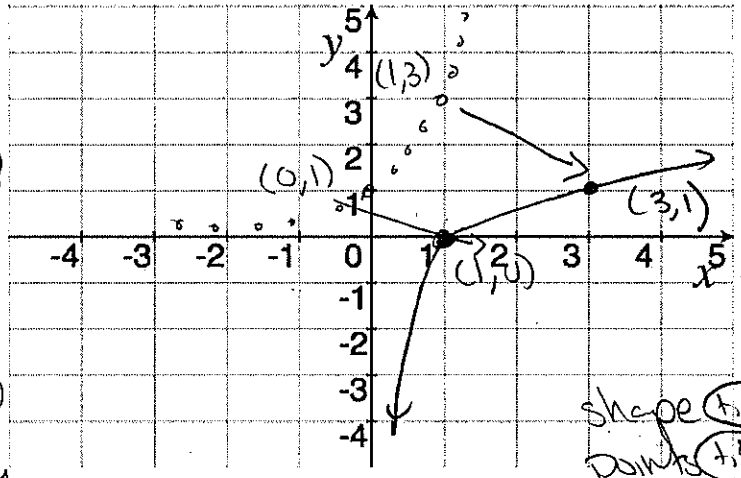
   — or —

   $\log_3 9 = ? \iff 3^? = 9$

   $\Rightarrow ? = 2$

   answer (+.5)
   prep/alg (+.5)

   (b) [1] (LogFunctionWks #2)
   Graph $g(x)$.



shape (+.5)
points (+.5)

recall $\log_3(x) = y$ is the inverse function to $3^x = y$ (graphed with dots)

2. [3] (A.1 #142) Let A and B be two circles where the radius of B is four times the radius of A. How many times larger is the area of circle B than that of A? Justify your answer.

Let r_B be the radius of circle B and r_A be A's.

(+1) Then $r_B = 4r_A$

(+.5) Recall the Area of a circle is πr^2 so

Area of circle B $= \pi r_B^2$

$= \pi (4r_A)^2$

$= \pi 4^2 r_A^2$

$= 4^2 \pi r_A^2 = 4^2 \cdot$ Area of circle A

(+.5) a factor of 16

alg/justification (+1)

3. [2] (WebHW16 #13) Write the expression as a single logarithm:

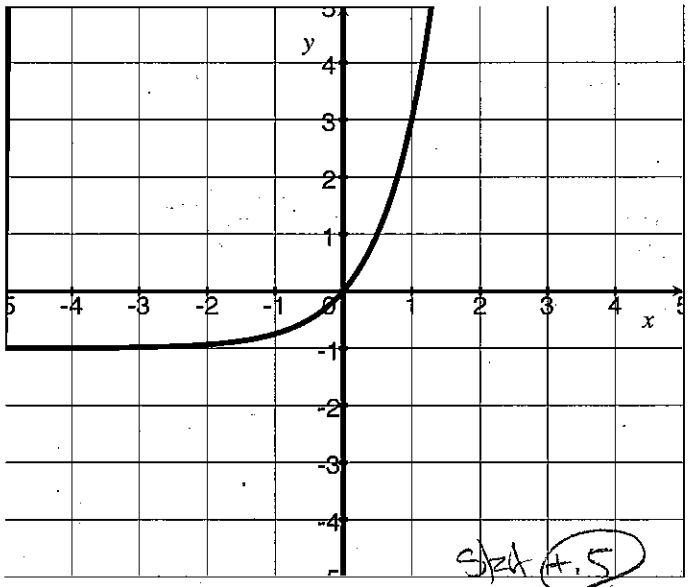
$$\frac{1}{2}\ln(x) - \ln(y) + 3\ln(z)$$

$\ln(x^{\frac{1}{2}}) - \ln(y) + \ln(z^3)$ (+.5) notation (+.5)

(+.5) $\ln \frac{x^{\frac{1}{2}}}{y} + \ln(z^3)$

$\ln \frac{x^{\frac{1}{2}} \cdot z^3}{y}$ (+.5) or $\ln \frac{\sqrt{x}}{y} \cdot z^3$ or $\ln \frac{z^3\sqrt{x}}{y}$

4. [3] (ExpFunctionWks #3) Given that $f(x)$ is an exponential function of the form $y = b^x$ that has been vertically shifted and is graphed below. Find the equation.



start (+.5)

(+.5) Recall the graph of b^x passes thru (0,1) but this graph passes thru (0,0)

(+.5) So there was a vertical shift DOWN by 1.

So $f(x) = b^x - 1$

passes thru (1,3) so

(+.5) $3 = b^1 - 1$

$+1 \quad +1 \Rightarrow b = 4$

So $f(x) = 4^x - 1$ (+.5)

alg (+.5)

Vertical shifts correspond to addition or subtraction so (+.5)

$f(x) = b^x + c$ for values $b+c$

or

passes thru (0,0) so

$0 = b^0 + c \Rightarrow 0 = 1 + c$

$\Rightarrow c = -1$ (+.5)

alg (+.5)

So $f(x) = b^x - 1$

passes thru (1,3) so

$3 = b - 1 \Rightarrow b = 4$ (+.5)

So $f(x) = 4^x - 1$ (+.5)