

NAME:

1. [7] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

T F  $\frac{1}{\frac{a}{2}} = \frac{2}{a}$

T F  $(x^3)^2 = x^5$

T F  $\frac{\log x}{\log y} = \frac{x}{y}$

T F  $\log(\log(10)) = 0$

T F  $360^\circ = 2\pi$  radians

T F The range of  $y = 2^x + 1$  is  $0 < y$

T F  $x^{-2} = x^{\frac{1}{2}}$

Show all your work. Reasonable supporting work must be shown to earn credit.

2. [3] (WebHW9 #2) How much money should a couple invest when a child is born in order for them to gift that child with \$5,000 on their 18th birthday? Assume that the interest is 5% compounded twice a year.
3. [3] (Quiz3 #1) Explain why “Simplify:  $\frac{-1}{9}x^2y^3(3x^3)^2$ ” is a bad quiz question and what you would replace it with.

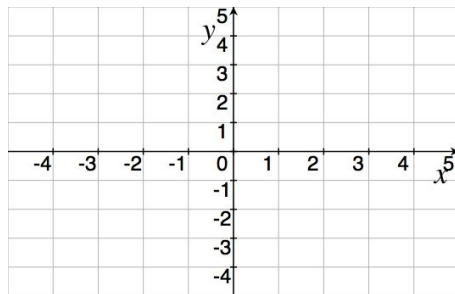
4. For each equation below, find the real or complex  $x$ :

(a) [3] (exponentActivity pg4)  $3(x + 1)^{-2} - 7 = 0$

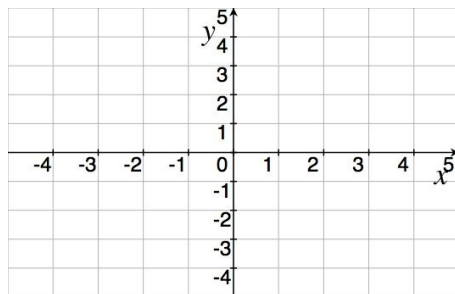
(b) [4] (WebHW8 #27)  $\log_{10}(x + 4) + \log_{10}(x - 5) = 1$

5. Provide a graph AND an algebraic rule/expression for each of the functions described:

(a) [3] (WebHW7 #20) A logarithmic function whose domain is  $(-3, \infty)$



(b) [3] (§3.1 #56) A function of the form  $b^x + c$  that passes through  $(0, -2)$  and  $(1, 2)$



6. Assume that we know  $\log_3(x) = 8$  and  $\log_3(y) = 49$ .
- (a) [1] (WebHW7 #13) Rewrite both the above logarithmic equations as exponential equations.

(b) [2] (§3.3 #16) Find  $\log\left(\frac{y}{x^2}\right)$

7. [4] (WebHW8 #30) Let  $f$  be an exponential of the form  $f(x) = \frac{12}{2 + be^{kt}}$ . It is known that  $f(0) = 3$  and  $f(1) = \frac{1}{2}$ . Find  $f(3)$ .

8. [4] (ExpLogApplications #8) *Richter Scale*: Let  $I$  be the intensity of an earthquake  $X$  and  $S$  be the intensity of a 'standard' earthquake. Then the measurement of an earthquake  $X$  as measured on the Richter Scale is:

$$\log\left(\frac{I}{S}\right)$$

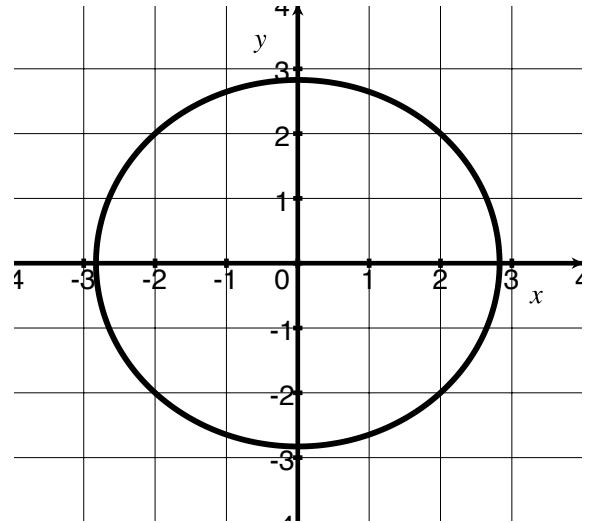
In March of 2011 Japan's earthquake was 9.0 on the Richter Scale. February 2001 Tacoma had an earthquake measuring 6.8 on the Richter Scale. How many more times more intense was Japan's earthquake to the one in Tacoma?

9. Consider the graph on the right.

(a) [2] (CircleAngles #1) Is the graph a function? Why or why not?

(b) [1] Find *all* points on the graph when  $x = 2$ .

(c) [2] Find an equation for the graph.



10. Let  $\theta = -\frac{2\pi}{3}$ .

(a) [2] (WebHW10 #7) Draw the angle  $\theta$ .

(b) [1] (§4.1 #40) Convert  $\theta$  into degrees.

11. Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.

No, doing both questions will not earn you extra credit.

- (a) [5] (Word Problem2 #4) You have four ten-year subsidized loans you took out to pay for college. Below is a table of the loans taken and their respective effective annual interest rates (AIR):

loan (\$)	8,000	9,000	10,000	12,000
AIR (%)	3.51	4.22	5.01	6.31

After graduation you are given the option of consolidating (that is take out one loan to pay off *all* the balances on your current loans). Assume all loans are continuously compounded once interest start accruing. You do not have a job lined up yet so you doubt you will be able be to make any payments for the three years, what rate would you need to consolidate your loans at to be in a better position three years from now?

- (b) (§3.4 #98) UW Tacoma has about 5000 students. At noon two students noticed food in the SIAS office and heard it was free for the taking. A rumor began to spread and by 1pm, 200 students had heard it. It is reasonable to assume that the number of people who have heard the rumor is modeled by  $\frac{5000}{1 + ae^{kt}}$  where  $t$  is the number of hours since noon and  $f(t)$  is the number of students who have heard the rumor. Find when  $\frac{3}{4}$  of the student body at UW Tacoma has heard the rumor.