

NAME:

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

T F $\frac{3}{x} + \frac{2}{x^2} = \frac{11}{x^2}$

T F $\sqrt{(x^2)} = x$ for all x .

T F $6^{\log_6(x)} = x$ for all x .

T F $\log_5(x) - \log_5(y) = \frac{\log_5(x)}{\log_5(y)}$ for x and y greater than zero.

T F The domain of $\log_3(x + 3)$ is $(-3, \infty)$.

T F $2 * 8^x = 16^x$.

T F $(b^x)^{x-1} = b^{x^2-x}$ for $b > 0$.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

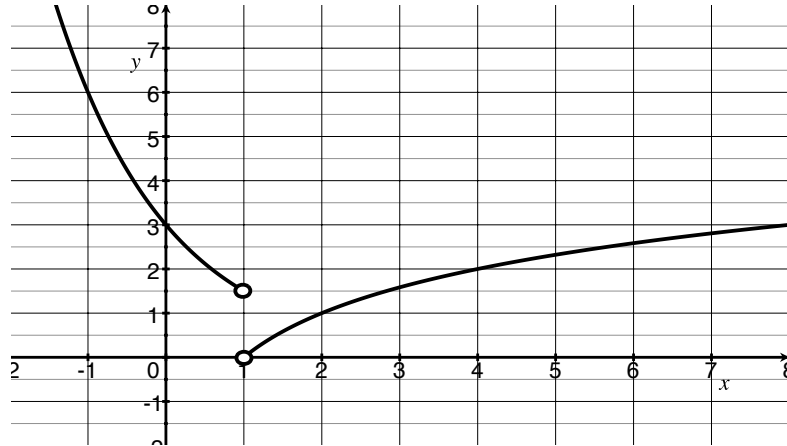
2. [4] (mini-quiz) Solve for y and simplify as much as possible given:

$$-x = \frac{3y}{xy - 6}$$

3. Let f be the function whose graph is given below.

(a) [1] (§4.2 #41)
Find the range of f .

(b) [4] (§4.2 #55)
Sketch the graph of
 $2f(x) - 1$



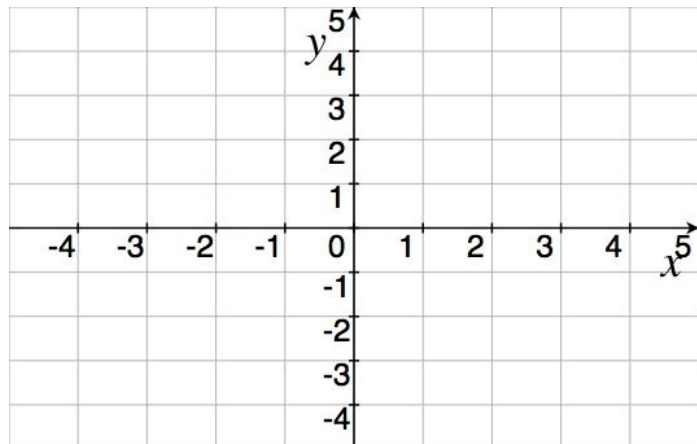
(c) [5] (WebHW #4 & §4.2 #38) The function f is of the form Ca^x when $x < 1$ and of the form $\log_b(x)$ when $1 < x$. Find a formula for f in this indicated form.

$$f(x) = \begin{cases} Ca^x & x < 1 \\ \log_b(x) & 1 < x \end{cases}$$

4. Let $g(x) = \log_3(x + 2)$

(a) [2] (§4.2 #42) Sketch
a graph of g

(b) [2] (WebHW9 #16)
Find the domain of g .



5. [3] (exp wks #2) Simplify: $\frac{(6st^3)^2}{2t^{-1}\sqrt{s}}$

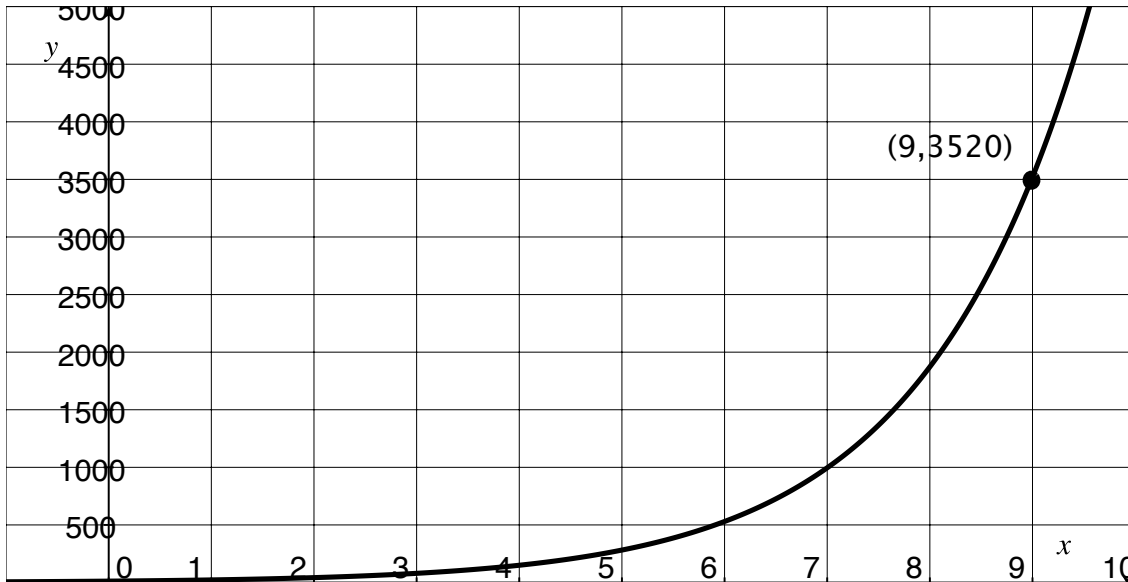
6. Find all x that satisfy the following:

(a) [3] (WebHW10 #14) $\frac{80}{1 + e^{-x}} = 7$

(b) [3] (10/30 lecture) $\log_6(x + 1) = 1 - \log_6(x + 2)$

7. [3] (quiz4 #3) A sum is invested at an interest rate of 8% per year. Use exponential growth models to approximate how long it will take for the investment to triple.

8. Cyrano Jones gives one tribble to Uhura in the hopes to boost his sales. It turns out that tribbles are born pregnant and once fed they give birth. Dr. Spock noticed this phenomenon and began to track the population of tribbles when Uhura showed him her new family of twelve tribbles at 0800 (8am). The data is plotted below where the horizontal axis is recording the number of hours since 0800 and the vertical axis is recording the number of tribbles on the Enterprise.



- (a) [2] (§2.2 23) Use the graph to *estimate* when there were 2000 tribbles on the Enterprise.
- (b) [1] (§2.2 #55) Is the above a graph of a function? Why or why not?
- (c) [1] Reread the above description. What is the initial population that Dr. Spock recorded?
- (d) [4] (§4.1 #39) Given that the population of tribbles f is well approximated by an exponential function in the number of hours x since 0800, use the data point (9, 3520) on the graph to find the rule to describe the population at time x .

9. [5] Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.

(a) (Fall11 Exam2#10) Legislation passed last year to let the University of Washington raise its own tuition, but previous to that the state set the maximum percentage increase that tuition could be raised, call it r . Between '07 and '10, the University raised tuition by as much as the state would allow for each year. The '07 to '08 school year had a tuition of approximately \$6000. In the '10 school year the tuition was approximately \$8,700.

- i. What percentage rate is the University of Washington raising its tuition every year?
- ii. If the University of Washington continues increasing tuition rates at the above fixed percentage, when will the cost of tuition exceed \$100,000?

(b) (Word Problem Wks #10) Recall from class that pH is measured on a logarithmic scale and that the pH level of a substance can be computed by $\text{pH} = -\log[\text{H}^+]$, where $[\text{H}^+]$ is usually the concentration of hydrogen ions measured in moles per liter (M).

Assume that the white vinegar in this problem has a pH level of 2.5 and your stomach acid has a pH level of 1.6.

- i. How many times stronger is stomach acid than the white vinegar?
- ii. If you found a substance X whose $[\text{H}^+]$ was six times as intense as vinegar, what would its pH measure be?