

NAME:

1. [7] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let  $x$  &  $y$  be positive real numbers.

T F  $\frac{3x + y}{3z} = \frac{x + y}{z}$

T F  $2^x + 5x = 8$  is a polynomial

T F  $4^{\frac{1}{2}} = 4^{-2}$

T F  $\log_5(\log_5(5)) = 0$

T F  $(x^2)^3 = x^6$

T F  $x^0 = 0$

T F  $\log_2(x + y) = \log_2(x) + \log_2(y)$

Show your work for the following problems. The correct answer with no supporting work will receive NO credit (this includes multiple choice questions).

2. [3] Explain what an exponential function is as you would to a 5th grader.

3. [4] Write a polynomial  $p$  that satisfies the following criteria:

- as  $x$  goes to  $\infty$ , then  $y$  goes to  $-\infty$
- $-2$ ,  $1$ , and  $3$  are the only roots.

Note: there is more than one right answer!

4. [3] (LogPractice #1) If you invest \$5,500 with an annual rate of 7% compounded quarterly, how much money do you have after 10 years?

5. [5] The area of a rectangle is  $5x^4 - 15x^3 + 22x^2 - 6x + 8$  cm<sup>2</sup>. Its length is also a function of  $x$  and is  $x^2 - 3x + 4$  cm. Find the width as a function of  $x$ .

6. Simplify:

(a) [2] (WebHW7 #7)

$$\frac{5(x^{-3}y)^{-2}}{(5x)^2}$$

(b) [2] (PracticeExam #4)

$$4 + \log_3 \left( \frac{1}{9} \right)$$

7. Find all  $x$  that satisfy:

(a) [4] (WebHW8 #22)  $\log_5(2x + 5) - \log_5(x + 5) = 1$

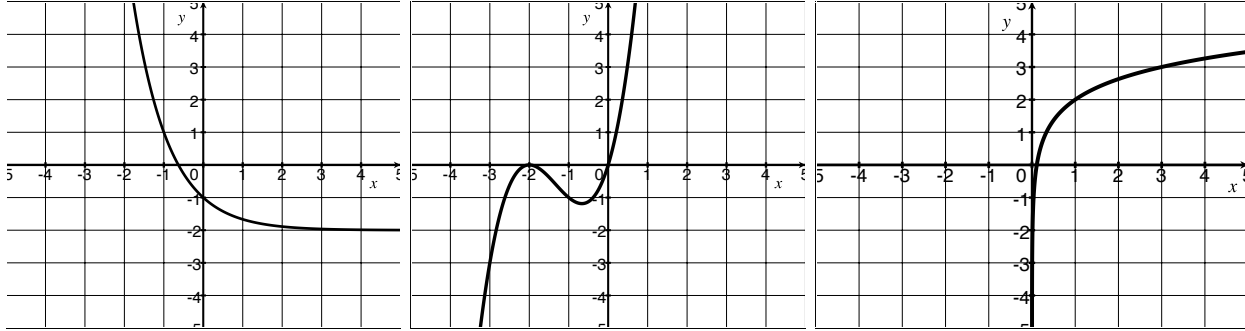
(b) [3] (LogPropertySheet#4)  $\frac{11}{1 + e^{2x}} = 3$

8. [3] (Quiz3 #1 &4) Three different function forms are given below. Match each with the graph it could make if the parameters ( $a$ ,  $b$ ,  $c$ , etc) were chosen correctly.

i)  $ax^3 + bx^2 + cx + d$

ii)  $g(x) = b^x + c$

iii)  $h(x) = \log_b(x) + c$



9. [3] For one of the above, find the parameters ( $a$ ,  $b$ ,  $c$ , etc) that describes the graph that is given. No, doing more will not earn you extra credit.

10. [6] (§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.

11. [5] (LogsInPracticeSheet #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. No, doing both questions will not earn you extra credit.

- (a) *Decibels*: The loudness of a sound is measured in decibels and is related to the intensity  $I$  by

$$10 \log \left( \frac{I}{S} \right)$$

where  $S = 10^{-12}$  W/m<sup>2</sup>.

Normal conversation has a sound level of about 65 decibels. How many more times intense than normal conversation is the sound an iPod operating at the French maximum of 100 decibels?

- (b) *Newton's Law of Cooling*: If  $D$  is the initial temperature difference between an object and its surroundings, and if its surroundings have a temperature  $T$ , then the temperature of the object  $A$  and time  $t$  is modeled by:

$$A = T + De^{-kt}$$

where  $k$  is a positive constant that depends on the type of object.

Initially coffee has a temperature of 200°F in a room that is 70°. After ten minutes the temperature is 150°. When will the coffee get down to 100°?