

NAME:

1. [8] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

T F For all numbers  $x$ ,  $\sqrt{x^2} = x$

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

T F For all numbers  $x$  and  $b$ ,  $\sqrt{b+x} = \sqrt{b} + \sqrt{x}$

T F For all positive numbers  $x$  and  $y$ ,  $\log(x+y) = \log(x) \cdot \log(y)$

T F For all positive numbers  $b$ ,  $\log_b 1 = 0$

T F For all positive numbers  $x$ ,  $\log 8x^2 = 2 \log 8x$

T F  $\frac{\pi}{4}$  radians is equal to  $\frac{9\pi}{4}$

T F  $\frac{3\pi}{2}$  radians is the same angle as  $270^\circ$

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

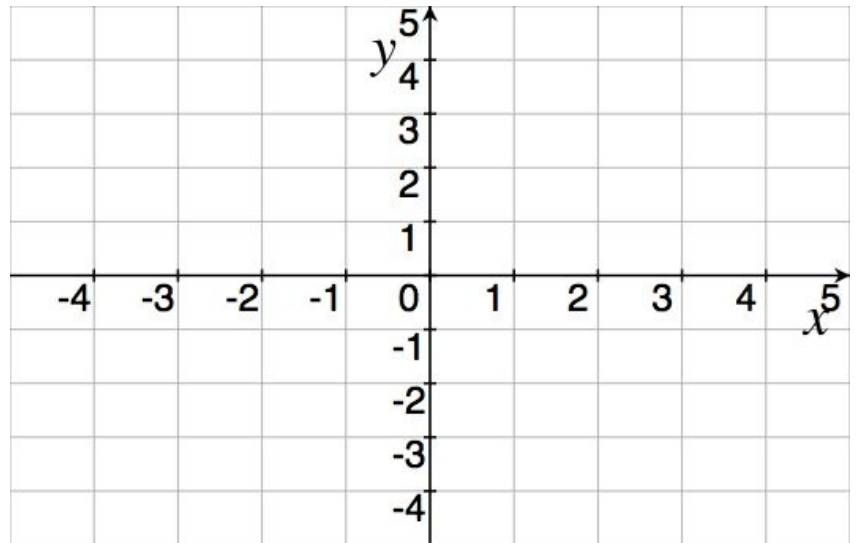
2. [4] (mini-quiz) Let  $t$  be a non-zero real number, solve for  $r$  and simplify given:

$$\frac{1}{\frac{1}{r} + \frac{1}{2}} = t$$

3. Let  $f$  be the *function* defined by:

$$f(x) = \begin{cases} 2 & x < -2 \\ -\log_5(x+2) & -2 < x \leq 3 \end{cases}$$

(a) [4] (§4.2 #41) Graph  $f$ .



(b) [1] (§4.2 #53) What is the range of  $f$ ?

4. [5] (WebHW9 #14 & Practice Exam #4) Simplify each of the following:

(a)  $\log_3\left(\frac{1}{27}\right)$

(b) Assume  $x$  and  $y$  are positive:  $\frac{\sqrt[3]{(x^2)(y^2)^{\frac{3}{2}}}}{x^{\frac{2}{3}}y^{-2}}$

5. Find all  $x$  that satisfy the following:

(a) [3] (WebHW10 #12)  $4(1 + 10^{9x}) = 5$

(b) [3] (§4.4 #49)  $\ln(x - 5) - \ln(4) = \ln(5) - \ln(x + 3)$

6. [3] (Circle Wks #4) Find the point(s) on are on the unit circle *and* on the line  $y = x$ .

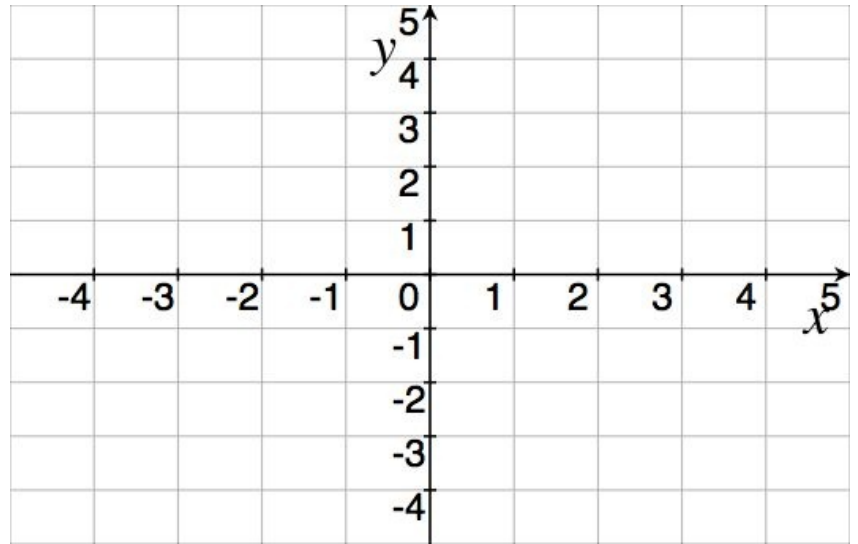
7. (§6.1 #43) Let  $\theta = \frac{17\pi}{6}$  be an angle in standard position.

(a) [2] Sketch the angle  $\theta$ .

(b) [2] Find an angle between 0 and  $2\pi$  that is coterminal with  $\theta$ .

8. Let points  $A$  and  $B$  have the coordinates  $(2, 2)$  and  $(-3, -3)$ , respectively.

- (a) [1] (§1.8 #1) Plot the points  $A$  and  $B$  on the axes provided.
- (b) [4] (§1.8 #84) Find an equation of the circle with the endpoints of a diameter  $A$  and  $B$ .



9. A sound with intensity  $x$  has  $10 \log \frac{x}{I_0}$  decibels, where  $I_0 = 10^{-12}$  watts per square meter ( $\text{W}/\text{m}^2$ ).

- (a) [2] (§4.5 #39) France passed a law limiting iPods and other MP3 players to a maximum possible volume of 100 decibels. Find the maximum intensity (in  $\text{W}/\text{m}^2$ ) an iPod is legally allowed to output in France.
- (b) [3] (§4.5 #40) 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?

10. [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) (WebHW11 #7) The University of Washington has been raising its tuition rates a fixed percentage each year for the past 4 years. The '07 to '08 school year had a tuition of approximately \$6000. Last year ('10 to '11 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 #3) You took out a ten-year subsidized loan each of the four years you attended college to pay for tuition, books, and miscellaneous academic fees. Below is a table of the loans taken and their respective effective annual interest rates (AIR):

loan (\$)	7,500	8,000	9,000	10,000
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?