

## Chapter 5 Practice Problems

This is the basic calculator only part. Please show all appropriate work.

1. Evaluate. No work is needed, only the answer. "Not possible" is a valid answer.

a)  $\log_{12} 1 =$       b)  $\log_2 \left( \frac{1}{16} \right) =$       c)  $\log_{11} 11^8 =$       d)  $\log .000001 =$

e)  $7^{\log_7 81} =$       f)  $\log_4 8 =$       g)  $e^{2 \ln 7} =$       h)  $\log_5 0 =$       i)  $\log_3 27 \sqrt[5]{9} =$

j)  $\log_3 18 - \log_3 100 + \log_3 50 =$       k)  $\log_4 16^{23} =$

2.  $\log_8 74$  is between what two consecutive integers?

3. What is the domain of  $\log_4(x^2 + 4x - 5)$ ?

4. Solve these equations for  $x$ :

a)  $\log_3 x = 3$

b)  $\log_5 25 = x$

c)  $\log_x 4 = \frac{1}{16}$

d)  $4^x = \sqrt[3]{16}$

e)  $\log_{\frac{1}{5}} 125 = x$

5. Graph  $y = 3^x$  and  $y = 5^x$  on the same coordinate system. Clearly label each graph

6. Graph these functions:

a)  $f(x) = \log_2 x$       b)  $f(x) = \log_2 x + 2$       c)  $f(x) = 3 - \ln(x + 3)$

You may use your graphing calculator on these problems.

7. Solve these equations. Give your answers correct to the nearest  $10^{\text{th}}$  or exactly. Show the process you used to solve, do not graph them on your calculator

a)  $3^x x^2 - 4(3^x) = 0$

b)  $2e^{2x} - 5e^x - 12 = 0$

c)  $5^x = 8^{x+3}$

d)  $\ln(3x - 6) = 4$

e)  $\log_7(3x + 5) - \log_7(x - 5) = \log_7 8$

8. Jeanie invested \$2000 in an account that pays 8% compounded quarterly.

a) What is the equation that gives the amount as a function of time (measured in years)

b) How much will Jeanie's investment be worth in 5 years?

c) Extra credit: 8% compounded quarterly is equivalent to what percent compounded monthly?

9. Find three answers to this equation by graphing it on your calculator. The answer(s) should be correct to the nearest hundredth.

$$2^x = x^2 + 3x - 2$$

10. The population of Portola Valley is growing exponentially and can be modeled with the formula  $n(t) = n_0 e^{rt}$  where  $t$  is the number of years past 1990. In 1990, the population was 4194 and in 2000, the population was 4462.
- Find the value of  $r$  in the formula
  - What is the predicted population in 2010?
  - When will the population reach 6000?
11. When a person dies, their time of death is approximated by comparing their current body temperature,  $T$ , to a normal body temperature of  $98.6^\circ$  F. If a body is found in a  $70^\circ$  F room, the time after death  $t$ , measured in hours, is given by  $t = -10 \ln\left(\frac{T - 70}{98.6 - 70}\right)$ .
- If a body is found at a temperature of  $85.7^\circ$  F at 10:30 am, approximately what time did the person die?
  - If it has been 12 hours since a person died, what is the predicted temperature of their body?

HONORS ONLY:

12. For  $f(x) = \ln(\ln(\ln x))$
- Find the domain of the function (1 pt)
  - Find the inverse of the function (2 pts)
13.  $\log_2(\log_3 x) = 4$  (3 pts)

Answers to the Ch 5 Practice Problems:

- a) 0 b) -4 c) 8 d) -6 e) 81 f)  $3/2$  g) 49 h) Not Possible i)  $17/5$  j) 2 k) 46
- 2 and 3
- $x > 1$  or  $x < -5$
- a) 27 b) 2 c)  $4^{16}$  d)  $2/3$  e) -3
- Do by hand, check with GC
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- a) 2, -2 b)  $\ln 4$  c)  $3 \ln 8 / (\ln 5 - \ln 8)$  or  $3 \log 8 / (\log 5 - \log 8)$  d)  $(e^4 + 6) / 3$  e) 9
- a)  $2000(1.02)^{4t}$  b) \$2971.89 c) 7.94%
- 1, -3.582, 5.4704 (set your windows to  $y_{\max} = 100$  and  $y_{\text{sc1}} = 10$  for the last intersecting pt)
- a) 0.00619 b) 4746 people approximately c) In 2047
- a) 4:30 AM b) 78.6 degrees F

12. a)  $x > e$  b)  $f^{-1}(x) = e^{\left[ e^{(e^x)} \right]}$  13.  $3^{16}$