Unit 2 Test Prep

1. Use the exponential function to answer the following questions.

$$f(x) = 12(0.96)^x$$

a) Find f(6) and round to 2 decimal places

$12(0.96)^6 = 9.39$

b) What is the initial value

12

c) What is the base value

0.96

d) Is the exponential function growing or decaying

Decaying

2. Axel invested $480 into a bank account at an interest rate of 8% compounded quarterly. How much money does she have after 7 years?

$n = 4$

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

a. $355.69
b. $822.64
c. $189.31
d. $835.69

$\$480 = P$

$8\% = r = 0.08$

$7 = t$

$4 = n$

$A = 480\left(1 + \frac{0.08}{4}\right)^{4(7)}$

3. The population P(t) of bacteria in a petry dish is modeled by the following equation where t measures in hours since the population study began.

$$P(t) = \frac{1200}{1 + 11 \times 1.7^{-t}}$$

a. What is the carrying capacity?

1200

b. What is the initial population of bacteria?

$P(0) = \frac{1200}{1 + 11 \times 1.7^{0}} = 100$

c. What is the population of bacteria after 4 years?

$\frac{1200}{1 + 11 \times 1.7^{-4}} = 517$

4. Change the equation to logarithmic form

$6^{3x} = 36$

$\log_6(36) = 3x$

~~$\log \frac{1}{4} = \log 3x$~~

5. Change the equation to exponential form

$\log(x - 3) = 2$

~~$x = 10^2$~~

$x - 3 = 10^2$

$10^2 = x - 3$

ln → e

log = exp.

6. Solve the equation algebraically. Round the answer to 4 decimal places

$$4(3^x) + 10 = 90$$

$$-10 \quad -10$$

$$\frac{4(3^x)}{4} = \frac{80}{4}$$

$$3^x = 20$$

$$\log_3(20) = x$$

Solution: 2.7268

7. Solve the following algebraically. Round to 2 decimal places

$$2\log_e(x) + 5 = 19$$

$$-5 \quad -5$$

$$\frac{2\log_e(x)}{2} = \frac{14}{2}$$

$$\log_e(x) = 7$$

$$\ln(x) = 7$$

$$e^7 = x$$

Solution: 1096.63

8. Solve the following algebraically. Round to 4 decimal places

$$5\log_2(3x) - 7 = 15$$

$$+7 \quad +7$$

$$\frac{5\log_2(3x)}{5} = \frac{22}{5}$$

$$\log_2(3x) = \frac{22}{5} = 4.4$$

Solution: 7.0374

$$\frac{2^{4.4}}{3} = \frac{3x}{3}$$

$$7.0374 = x$$

log - log +

9. Expand the expression. If possible, write the answer without exponents

$$\ln\frac{m^3x^2}{5}$$

$\ln(m^3) + \ln(x^2) - \ln(5)$

$3\ln(m) + 2\ln(x) - \ln(5)$

10. Combine the expression. If possible, write the answer without exponents

$$\text{Log}(x^2) + \text{Log}(5x) - \text{Log}(6)$$

$\log\left(\frac{x^2 5x}{6}\right)$

11. Solve the equation using log properties.

$$\log_3(x+8) = 2 - \log_3 x$$

$+\log_3 x$

$\log_3(x) + \log_3(x+8) = 2$

$\log_3(x^2+8x) = 2$

$3^2 = x^2+8x \quad \rightarrow 9 = x^2+8x \quad = 0 = x^2+8x-9$

$-9 \quad\quad -9$

	x	9
x	x^2	$9x$
-1	$-x$	-9

$= 8x$

12. Solve the equation using log properties.

$$2\log a = \log(7a+18)$$

$\log(a^2) = \log(7a+18)$

$a^2 = 7a+18$

$-7a \quad -18$

$a^2 - 7a - 18 = 0$

	a	2
a	a^2	$2a$
-9	$-9a$	-18

13. The formula $C(x) = 280 \ln(x + 1) + 1925$ models the number of calories consumed by a person owning x acres of land.

a. How many calories daily would a person consume if they owned 1.5 acres of land?

$C(1.5) = 280 \ln(1.5+1) + 1925 = 2181.56$

b. Estimate the number of acres owned for which the average intake is 2300 calories per day.

$2300 = 280\ln(x+1) + 1925$

-1925

$\frac{375}{280} = \frac{280\ln(x+1)}{280}$

$1.339 = \ln(x+1)$

$e^{1.339} = x + 1$

$3.814 = x + 1$

$-1 \quad -1$

$2.814 = x$