

Pre-Calculus
Quiz Review: 3.1 - 3.3

$$y = P(1+r)^x$$

Name KEY
Date _____ Block _____

Answer the following:

1.) An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person's system decreases by about 29%.

a.) Write an exponential equation that models the situation. $y = 400(.71)^x$

b.) How much ibuprofen is left after 6 hours?

51.24 mg

c.) How long until there is less than 1 milligram in the adult's system? (round to two decimal places)

17.49 hours

2.) The foundation of your house has 1200 termites. The termite population grows at a rate of 2.4% per day.

a.) Write an exponential equation that models the situation.

$$y = 1200(1.024)^x$$

b.) How long does it take for the population of the termites to double? (round to two decimal places)

29.23 days

$\frac{y_2}{y_1} = 2$
2400

3.) Arsenic-74 is used to locate brain tumors. It has a half-life of 17.5 days.

a.) What is the decay factor? (round to four decimal places)

$$\left(\frac{1}{2}\right)^{1/17.5} \rightarrow (.9612)$$

b.) Write a half-life exponential function of a 90 mg sample.

$$y = 90\left(\frac{1}{2}\right)^{x/17.5}$$

c.) How much is left after 6 days?

70.96 mg

d.) How many days will it take for there to be less than 50 milligrams present? (round to two decimal places)

14.84 days

4.) The population of a town increases according to the model $P(t) = 2500e^{0.0293t}$, where t is the time in years, with $t = 0$ corresponding to 2000.

a.) Approximate the population in 2015 and 2025.

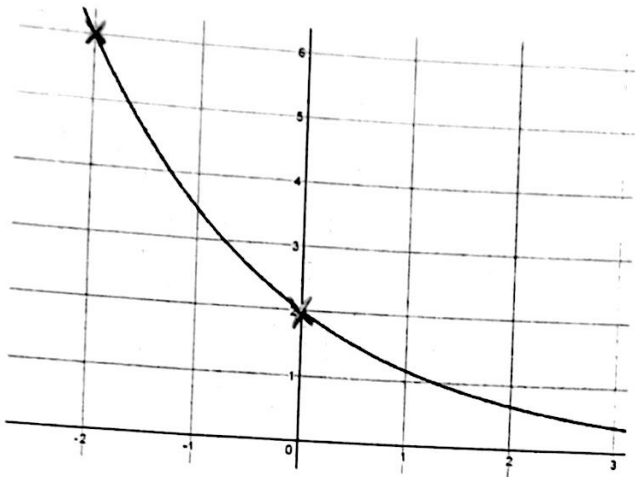
3879.83

5200.69

b.) How many years does it take for the population to break 15000? (round to two decimal places)

61.15 years

5.) Write the equation of the exponential function in rational, radical, and decimal notation.



Rational: $y = 2\left(\frac{1}{3}\right)^{\frac{x}{2}}$

Radical: $y = 2\sqrt[1/3]{x}$

Decimal: (round to four decimal places):

$y = 2(.5774)^x$

6.) Write the equation of the exponential function in rational, radical, and decimal notation.

x	y
-3	4.8
0	6
3	7.5
6	9.375

Rational:

$y = 6\left(\frac{5}{4}\right)^{x/3}$

Radical:

$y = 6\sqrt[3]{5/4}^x$

Decimal: (round to four decimal places):

$y = 6(1.0772)^x$

Evaluate each expression.

7.) $\log_2 81$

2

8.) $\log_2 3$

$1/3$

9.) $\log_2 32$

5

10.) $\log_8 1$

0

11.) $\ln e^4$ $\log_e e^4$

4

12.) $\log_8 2$

$1/3$

13.) $\log_3 \frac{1}{3}$

-1

14.) $\log_{\frac{1}{2}} 128$

-7

15.) $\log_4 2$

$1/2$

16.) $\log 1000$

3

17.) $\log_3 \frac{1}{243}$

-5

18.) $\log_{64} 4$

$1/3$

Expand each expression.

19.) $\log_2(x^3 \cdot y)^3$

$$\log_2 x^9 y^3$$

$$9\log_2 x + 3\log_2 y$$

Condense each expression.

22.) $2\log x + 4\log y + 3\log z$

$$\log x^2 y^4 z^3$$

24.) $3\log_2 x + 15\log_2 y$

$$\log_2 x^3 y^{15}$$

26.) $\frac{1}{3}\log x + \frac{1}{3}\log y + \frac{1}{3}\log z$

$$\log \sqrt[3]{xyz}$$

20.) $\log_3(z^4 \cdot \sqrt{x})$

$$4\log_3 z + \frac{1}{2}\log_3 x$$

21.) $\log_8\left(\frac{x^5}{y^20}\right)$

$$5\log_8 x - 20\log_8 y$$

23.) $\log_2 12 + \log_2 7 + \log_2 5$

$$\log_2 420$$

25.) $3\log_2 x - 6\log_2 y$

$$\log_2 \frac{x^3}{y^6}$$