Algebra II 2012 Spring Final Review I - KEY

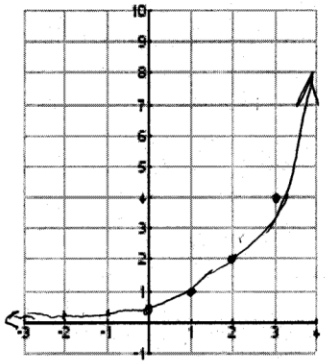
Review for Spring 2012 Final Exam I KEY **Algebra 2** **Name** _____

1. **Identify each of the following as being exponential growth, exponential decay, or neither.**

Grow A) $y=2(3.3)^x$ Decay B) $y=0.47(0.8)^x$ Nope C) $y=7x^3$

2. Graph $f(x)=\frac{1}{2}(2)^x$ on the grid below. Fill in the function values in the table using the numbers given for x. Use the graph to answer the questions to the right. Write **none** if that is the case.

X	-2	-1	0	1	2	3
Y	1/8	1/4	1/2	1	2	4



A) What is the domain of $f(x)=\frac{1}{2}(2)^x$?
All Reals

B) What is the range of $f(x)=\frac{1}{2}(2)^x$?
All Reals & $y>0$

C) Is this function exponential growth, exponential decay, or neither ? Grow

D) What is the x-intercept ? NONE

E) What is the y-intercept ? 1/2

F) Give the equation of any asymptote. $y=0$

G) Complete the statements about the end behavior of this function. $x \to -\infty, f(x) \to$ 0
$x \to \infty, f(x) \to$ $+\infty$

3. Write the equation of the exponential function that is modeled by the following situation and answer the question. The amount of bacteria in a culture is growing at the rate of 44% per hour. At noon one day it was 2000 cells. What would the amount be by noon of the following day?

$2000(1.44)^x$ $x=24 \Rightarrow 2000(1.44)^{24}$
12639497

4. **Find the equation of the inverse for each of the following.**

A) $f(x)=4x+5$
$y=\frac{x-5}{4}$

B) $f(x)=\frac{x-5}{8}$
$y=8x+5$

C) $f(x)=\frac{1}{4}x-9$
$y=4x+36$

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5. **Evaluate or simplify each of the following.**

A) $\log_{23} 1 =$ 0 B) $\log_3 \frac{1}{27} =$ -3 C) $\log_4 64 =$ 3 D) $\log_{16} 4 =$ $\frac{1}{2}$ E) $\log_3 3^y =$ y

6. Write the equation $25 = 5^2$ in logarithmic form. $\log_5(25) = 2$

7. Write the equation $\log_6 216 = 3$ in exponential form. $6^3 = 216$

8. Suppose an investment of \$3,000 is put into an account paying 6% (0.06 in decimal form) that is compounded 4 times a year. Use the formula $A = P(1+\frac{r}{4})^{4t}$ to find each of the items below.

A) Find the amount, A, of the investment (rounded to the nearest cent) after 15 years?

$3000\left(1+\frac{0.06}{4}\right)^{4(15)} = \$7329.66$

B) Determine the amount of time, rounded to the nearest tenth of a year, it would take for the investment to triple in value to become worth \$9,000. Show all the algebraic steps you use in solving the equation using logarithms. 18 years $9000 = 3000\left(1+\frac{0.06}{4}\right)^{4t} \Big/ \frac{9000}{3000} = \left(1+\frac{0.06}{4}\right)^{4t} \Big/ \log_{\left(1+\frac{0.06}{4}\right)}\left(\frac{3}{4}\right) = 4t \Big) \div 4$

9. Suppose a mass of 5 grams of some radioactive element has a half-life of 400 years. Use the formula $A = 5\left(\frac{1}{2}\right)^{\frac{t}{400}}$ to find each of the items below.

A) Find the amount, A, of the radioactive element after 100 years. Round the answer to the nearest tenth of a gram.

$5\left(\frac{1}{2}\right)^{\frac{100}{400}} = 4.2$ grams

B) Determine the number of years, rounded to the nearest whole number, which would be required for the amount remaining to be 3 grams. Show all the algebraic steps you use in solving the equation using logarithms. $3 = 5\left(\frac{1}{2}\right)^{\frac{t}{400}} \Big| \frac{3}{5} = \left(\frac{1}{2}\right)^{\frac{t}{400}} \Big| \log\frac{3}{5} \cdot 400 = \frac{1}{400}\left(\frac{1}{2}\right)^{t} \cdot 400 \Big| \frac{1200}{5} = \frac{1}{2}^{t}$ $\log_{1/2}\left(\frac{1200}{5}\right) = \log_{1/2}{}^{t}$ $t = 295$ years

10. **Use the properties to write the expression as a single logarithm.**

a. $\log_3 20 + \log_3 4 =$ $\log_3(80)$

b. $\log_5 20 - \log_5 4 =$ $\log_5(5)$

c. $3\log_6 x =$ $\log_6 x^3$

d. $2\log_b x + \log_b y - 3\log_b z =$ $\log_b\left(\frac{x^2 y}{z^3}\right)$

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11. **Use the properties of logarithms to expand the following logarithms.**

a. $\log_3 a^2bc^3 =$ $2\log_3 a + \log_3 b + 3\log_3 c$

b. $\log_7 \frac{4x^2}{3y^5} =$ $\log_7 \frac{(2x)^2}{(3y^5)} = 2\log_7(2x) - (5\log_7(3y) + \log_7(3))$ $2\log_7(2x) - (\log_7(3) + 5\log_7(y))$

12. **Use the change of base formula on the following logarithms.**

a. $\log_A B =$ $\frac{\log_{10} B}{\log_{10} A}$

b. $\log_6 8 =$ $\frac{\log_{10} 8}{\log_{10} 6}$

13. Solve. Give both the **exact answer** *and* the **approximate answer rounded to the nearest hundredth**.

a. $36^{x-5} = 6$ $5\frac{1}{2}$ 5,50

b. $5^{3x-2} = 120$ $\frac{\log_5(3000)}{3}$ 1.66

14. The number of minutes it takes to finish a race varies inversely with the speed the car is going. Write a function to demonstrate that a car going 50 mph takes 8 min. to finish the race. Find how long it will take a car driving 80 mph to finish the race.

equation $t = \frac{k}{s} = \frac{400}{s}$ $8\text{min} = \frac{k}{50\text{mph}}$ $k = 400\text{mph}\cdot\text{min}$

time to finish 5 min $t = \frac{400}{80}$

15. The price **"P"** paid for tomatoes varies directly as its weight **"W"** in pounds. If the price of 1.5 pounds of tomatoes is \$2.97, what is the price of 4.99 pounds of tomatoes?

$P = kW$ $2.97 = k(1.5)$ $k = \frac{2.97}{1.5} = 1.98$ $P = 1.98W$ $P = 1.98(4.99)$ $P = \$7.42$

Solve each equation. Remember to check for extraneous solutions.

16. $\frac{k+4}{4} + \frac{k-1}{4} = \frac{k+4}{4k}$ $k = -2$ $k = 1$

17. $\frac{1}{k} = \frac{1}{k^2+k}$ $\emptyset$

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18. $\frac{n^2-n-6}{n^2}-\frac{2n+12}{n}=\frac{n-6}{2n}$

$n=-6, -\frac{2}{3}$

19. $\frac{k^2+2k-8}{3k^3}=\frac{1}{3k^2}+\frac{1}{k^2}$

$K=-2, 4$

20. **Convert to radical form:**

a. $5^{\frac{3}{2}}=$ $\sqrt{5^3}$ b. $7^{\frac{4}{3}}=$ $\sqrt[3]{7^4}$ c. $2^{-\frac{1}{3}}$ $\frac{1}{\sqrt[3]{2}}$ d. $x^{\frac{3}{2}}$ $\sqrt{x^3}$

21. **Convert to rational exponent form:**

a. $\sqrt[4]{27}=$ $3^{3/4}$ b. $\sqrt[3]{16}$ $2\cdot 2^{1/3}$ c. $\sqrt{a^6b^4}$ a^3b^2 d. $\sqrt[3]{56x^{11}}$ $2\cdot 7^{1/3}x^{\frac{11}{3}}$

Solve each equation. Be sure to check for extraneous solutions. Circle your answers when finished.

22. $6\sqrt{2x-5}=12$

$X=4.5$

23. $3+\sqrt{3x-2}=12$ $x=27\frac{2}{3}$

24. **Solve the equation for c.** $\frac{c}{a^2-b^2}-\frac{1}{c}=0$ $c=\pm\sqrt{a^2-b^2}$

25. **Solve the equation for B.** $\frac{q}{m}=\frac{2V}{B^2r^2}$ $B=\pm\frac{\sqrt{\frac{2mV}{q}}}{R}$

Add / Subtract / multiply or divide the following rational expressions:

26. $\frac{3y^2-12}{y^2+4y+4}\div\frac{y^3-2y^2}{y^2+2y}$ $\frac{3}{y}$

27. $\frac{y^2-3y}{y^2-4}\cdot\frac{y-2}{y^2-2y-3}$ $\frac{y}{(y+1)(y+2)}$

28. $\frac{3}{x+1}+\frac{4}{x-1}$ $\frac{7x+1}{(x-1)(x+1)}$

29. $\frac{x+4}{x+5}-\frac{5}{x^2+10x+25}$ $\frac{x^2+9x+15}{(x+5)^2}$

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30: Use the table of values below

x	-3	-1	2	5
y	2	1	0	2

a. Give the domain and range of the relation:

Domain: $\{-3, -1, 2, 5\}$ Range: $\{2, 1, 0\}$

b. State the domain and range of the inverse:

Domain: $\{2, 1, 0\}$ Range: $\{-3, -1, 2, 5\}$

Solve. Show all work.

31. $8^{2x} = 4^{\frac{1}{2}}$

$(2^3)^{2x} = (2^2)^{\frac{1}{2}}$

$2^{6x} = 2$

$6x = 1$

$x = \frac{1}{6}$

32. $\log_2(6x-2) = \log_2(5-x)$

$6x - 2 = 5 - x$

$6x + x = 5 + 2$

$7x = 7$

$x = 1$

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

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

$x^2 - 8x = 9$

$x^2 - 8x - 9 = 0$

$x = 9$ $x = -1$

34. $2\log_2 x^3 = 6$

$6\log_2 x = 6$

$\log_2 x = 1$

$2^1 = x$

$x = 2$

Also review Statistics unit, specifically mean, median, mode, range definitions and operations

Know how to convert Degrees to Radians, Radians to Degrees and the Unit Circle