

Name _____
Algebra II CC – Midterm Review #3

Date _____
Period _____

UNIT 5: EXPONENTS & LOGARITHMS

1. Rewrite the expression $\frac{3a^5b^{-6}}{(3a^3b^2)^{-2}}$ with only positive exponents in simplest form.

2. The expression $6n^{\frac{2}{5}}$ is equivalent to

- | | |
|------------------------|------------------------|
| (1) $(\sqrt[5]{6n})^2$ | (3) $6(\sqrt[5]{n})^2$ |
| (2) $(\sqrt{6n})^5$ | (4) $6(\sqrt{n})^5$ |

3. For $a > 0$, the expression $5a^{-\frac{4}{7}}$ is equivalent to

- | | |
|--------------------------------|--------------------------------|
| (1) $\frac{1}{5\sqrt[7]{a^4}}$ | (3) $\frac{1}{5\sqrt[4]{a^7}}$ |
| (2) $\frac{5}{\sqrt[7]{a^4}}$ | (4) $\frac{5}{\sqrt[4]{a^7}}$ |

4. The expression $(\sqrt{de})^3$ is equivalent to

- | | |
|--------------------------|--------------------------|
| (1) $(de)^{\frac{2}{3}}$ | (3) $(de)^{\frac{3}{2}}$ |
| (2) $de^{\frac{2}{3}}$ | (4) $de^{\frac{3}{2}}$ |

5. The expression $\sqrt[3]{27x^6y^8}$ is equivalent to

- | | |
|---------------------------|---------------------------|
| (1) $3x^2y^{\frac{8}{3}}$ | (3) $3x^3y^{\frac{3}{8}}$ |
| (2) $9x^2y^{\frac{8}{3}}$ | (4) $9x^3y^{\frac{3}{8}}$ |

6. Solve for x : $\left(\frac{1}{36}\right)^{x+4} = 6^{3x+1}$

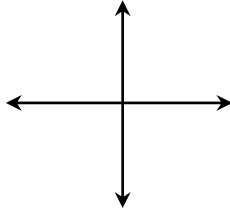
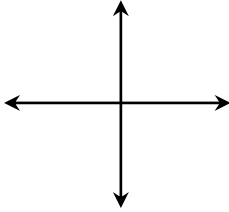
7. The expression $\frac{1}{5}\log x - 4\log y$ is equivalent to

(1) $\log \sqrt{x^5 y^4}$ (3) $\log \frac{\sqrt[5]{x}}{y^4}$

(2) $\log \frac{x^5}{y^4}$ (4) $\log \frac{x^5}{\sqrt[4]{y}}$

UNIT 6: GRAPHS OF FUNCTIONS

8. Complete the table below.

Function	$y = b^x$ ($b > 1$)	$y = \log_b x$ / $y = \ln x$
Sketch a graph		
Quadrants the graph is in		
Domain		
Range		
Point always on the graph		
Equation of Asymptote		

KEY FACT: What is the relationship between $y = b^x$ and $y = \log_b x$? _____

9. What are the x -intercept and the y -intercept of $g(x) = \log(2x + 3)$?

10. If $f(x) = 6x - 12$, find an equation of $f^{-1}(x)$, the inverse function of $f(x)$.

11. Given that $k(x) = x^9 - 4$, determine an equation that represents $k^{-1}(x)$, the inverse of $k(x)$.

12. Which equation is the result of translating $f(x) = e^x$ four units to the right and three units down?

(1) $g(x) = e^{x-4} - 3$ (3) $g(x) = e^{x-4} + 3$

(2) $g(x) = e^{x+4} - 3$ (4) $g(x) = e^{x+4} + 3$

13. The graph of $j(x) = -\ln(x+1)$ represents what transformation of the graph of $j(x) = \ln x$?

(1) a rightward shift of one unit and a reflection over the x -axis

(2) a leftward shift of one unit and a reflection over the x -axis

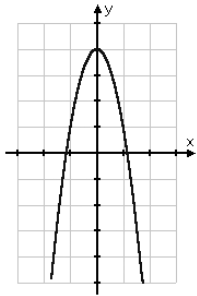
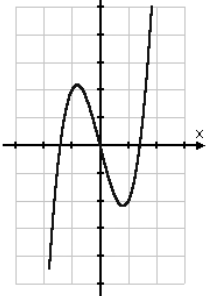
(3) a rightward shift of one unit and a reflection over the y -axis

(4) a leftward shift of one unit and a reflection over the y -axis

14. Even functions are symmetric over the _____.

Odd functions are symmetric over the _____.

15. Which functions are even, which functions are odd, and which are neither?

a) $f(-x) = -f(x)$		b) $f(-x) = f(x)$	
c) $g(x) = x^5 + 4x^3 - x$		d) $h(x) = 2 x + 3$	
e) 		f) 	

16. If $c(x) = x^3 - x^2 - 5$ and $d(x) = 4^x - 7$, determine and state, to the *nearest hundredth*, all of the values of x that solve the equation $c(x) = d(x)$.
17. The number of people, in thousands, living in a small city can be determined according to the model $P(x) = 480(1.05)^x$, where x is the number of years since 2004. Determine the average rate of change of $P(x)$, in thousands of people per year, for $0 \leq x \leq 12$ to the *nearest thousandth*.

Explain the meaning of the average rate of change in terms of city population.

UNIT 7: EXPONENTIAL MODELS

18. Which equation can be used to determine the time t in years it will take for a population of 425 bacteria that is growing at a continuous rate of 24% per year to double in size?
- (1) $850 = 425(0.24)^t$ (3) $850 = 425e^{0.24t}$
(2) $850 = 425(1.24)^t$ (4) $850 = 425e^{1.24t}$
19. A population of 1300 beetles is growing at a rate of 19% every year. Which equation can be used to determine the number of beetles, B , after w weeks?
- (1) $B = 1300(1.0033)^w$ (3) $B = 1300(1.0033)^{52w}$
(2) $B = 1300(1.0037)^w$ (4) $B = 1300(1.0037)^{52w}$
20. To the *nearest tenth of a percent*, determine the annual exponential growth rate of the value of a house that increased in price from \$230,000 to \$700,000 over 16 years.

- 21.** The cost of a gallon of milk has increased from \$2.75 in 2002 at a rate of 7.8% every three years.

Write an equation for $G(t)$, the cost of a gallon of milk t years since 2002.

Determine the number of years it will take, to the *nearest year*, for the cost of a gallon of milk to increase to \$4.00 per gallon.

- 22.** Dave invests \$750 in a bank account that pays interest at a nominal rate of 8.2% per year. Write an equation for $D(t)$, the value of Dave's bank account after t years. To the *nearest cent*, determine the values of Dave's account after six years.

Flora invests \$900 in a bank account that pays interests at a nominal rate of 7.14% per year compounded monthly. Write an equation for $F(t)$, the value of Flora's bank account after t years. To the *nearest cent*, determine the values of Flora's account after nine years.

Melissa invests \$690 in a bank account that pays 6.8% interest compounded continuously. Write an equation for $M(t)$, the value of Melissa's bank account after t years. To the *nearest cent*, determine the values of Melissa's account after three years.

- 23.** Using the model for $M(t)$ from the previous question, how long will it take, to the *nearest hundredth of a year*, for the values of Melissa's account to reach \$2000?