Name________________________________ **MRS22- Additional Work on Exponents**
Date: ____________ **Mr. Pineda**

1.
When $b > 0$ and d is a positive integer, the expression $(3b)^{\frac{2}{d}}$ is equivalent to

(1) $\frac{1}{\left(\sqrt[d]{3b}\right)^2}$
(2) $\left(\sqrt{3b}\right)^d$
(3) $\frac{1}{\sqrt{3b^d}}$
(4) $\left(\sqrt[d]{3b}\right)^2$

2.
Which function represents exponential decay?

(1) $y = 2^{0.3t}$
(2) $y = 1.2^{3t}$
(3) $y = \left(\frac{1}{2}\right)^{-t}$
(4) $y = 5^{-t}$

3.
Last year, the total revenue for Home Style, a national restaurant chain, increased 5.25% over the previous year. If this trend were to continue, which expression could the company's chief financial officer use to approximate their monthly percent increase in revenue? [Let m represent months.]

(1) $(1.0525)^m$
(2) $(1.0525)^{\frac{12}{m}}$
(3) $(1.00427)^m$
(4) $(1.00427)^{\frac{m}{12}}$

4.
What is the solution to $8(2^{x+3}) = 48$?

(1) $x = \frac{\ln 6}{\ln 2} - 3$
(2) $x = 0$
(3) $x = \frac{\ln 48}{\ln 16} - 3$
(4) $x = \ln 4 - 3$

5.
A student studying public policy created a model for the population of Detroit, where the population decreased 25% over a decade. He used the model $P = 714(0.75)^d$, where P is the population, in thousands, d decades after 2010. Another student, Suzanne, wants to use a model that would predict the population after y years. Suzanne's model is best represented by

(1) $P = 714(0.6500)^y$
(2) $P = 714(0.8500)^y$
(3) $P = 714(0.9716)^y$
(4) $P = 714(0.9750)^y$

6.
For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x?

I. $\frac{\sqrt[6]{x}}{\sqrt[3]{x}}$ II. $\frac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}}$ III. $x^{-\frac{1}{6}}$

(1) I and II, only
(2) I and III, only
(3) II and III, only
(4) I, II, and III

7.
The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010. As of today, consider the following two statements:

I. The current population is 110 million.
II. The population increases continuously by approximately 3.9% per year.

This model supports

(1) I, only
(2) II, only
(3) both I and II
(4) neither I nor II

8.
Jasmine decides to put \$100 in a savings account each month. The account pays 3% annual interest, compounded monthly. How much money, S, will Jasmine have after one year?

(1) $S = 100(1.03)^{12}$
(2) $S = \frac{100 - 100(1.0025)^{12}}{1 - 1.0025}$
(3) $S = 100(1.0025)^{12}$
(4) $S = \frac{100 - 100(1.03)^{12}}{1 - 1.03}$

9.

10.

An equation to represent the value of a car after t months of ownership is $v = 32{,}000(0.81)^{\frac{t}{12}}$. Which statement is *not* correct?

(1) The car lost approximately 19% of its value each month.
(2) The car maintained approximately 98% of its value each month.
(3) The value of the car when it was purchased was \$32,000.
(4) The value of the car 1 year after it was purchased was \$25,920.

A payday loan company makes loans between \$100 and \$1000 available to customers. Every 14 days, customers are charged 30% interest with compounding. In 2013, Remi took out a \$300 payday loan. Which expression can be used to calculate the amount she would owe, in dollars, after one year if she did not make payments?

(1) $300(.30)^{\frac{14}{365}}$
(2) $300(1.30)^{\frac{14}{365}}$
(3) $300(.30)^{\frac{365}{14}}$
(4) $300(1.30)^{\frac{365}{14}}$

11.

In 2010, the population of New York State was approximately 19,378,000 with an annual growth rate of 1.5%. Assuming the growth rate is maintained for a large number of years, which equation can be used to predict the population of New York State t years after 2010?

(1) $P_t = 19{,}378{,}000(1.5)t$
(2) $P_0 = 19{,}378{,}000$
$P_t = 19{,}378{,}000 + 1.015P_{t-1}$
(3) $P_t = 19{,}378{,}000\,(1.015)^{t-1}$
(4) $P_0 = 19{,}378{,}000$
$P_t = 1.015P_{t-1}$

12.

The value of a new car depreciates over time. Greg purchased a new car in June 2011. The value, V, of his car after t years can be modeled by the equation $\log_{0.8}\left(\frac{V}{17000}\right) = t$.

What is the average decreasing rate of change per year of the value of the car from June 2012 to June 2014, to the *nearest ten dollars per year*?

(1) 1960
(2) 2180
(3) 2450
(4) 2770

13.

Iridium-192 is an isotope of iridium and has a half-life of 73.83 days. If a laboratory experiment begins with 100 grams of Iridium-192, the number of grams, A, of Iridium-192 present after t days would be $A = 100\left(\frac{1}{2}\right)^{\frac{t}{73.83}}$.

Which equation approximates the amount of Iridium-192 present after t days?

(1) $A = 100\left(\frac{73.83}{2}\right)^t$
(2) $A = 100\left(\frac{1}{147.66}\right)^t$
(3) $A = 100(0.990656)^t$
(4) $A = 100(0.116381)^t$