exponential/linear review

Name: _____ **Date:** _____

1. The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

Year	Balance, in Dollars
0	380.00
10	380.00
20	562.49
30	1232.49
40	1824.39
50	2700.54

Which type of function best models the given data?

A. linear function with a negative rate of change

B. linear function with a positive rate of change

C. exponential decay function

D. exponential growth function

2. The value in dollars, $v(x)$, of a certain car after x years is represented by the equation $v(x) = 25,000(0.86)^x$. To the *nearest dollar*, how much more is the car worth after 2 years than after 3 years?

A. 2589 B. 6510

C. 15,901 D. 18,490

3. Which situation could be modeled by using a linear function?

A. a bank account balance that grows at a rate of 5% per year, compounded annually

B. a population of bacteria that doubles every 4.5 hours

C. the cost of cell phone service that charges a base amount plus 20 cents per minute

D. the concentration of medicine in a person's body that decays by a factor of one-third every hour

4. Krystal was given $3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?

A. $3000(1 + 0.02)^{16}$ B. $3000(1 - 0.02)^{16}$

C. $3000(1 + 0.02)^{18}$ D. $3000(1 - 0.02)^{18}$

5. Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, y, of one account that was left inactive for a period of x years.

   What is the y-intercept of this equation and what does it represent?

   A. 0.98, the percent of money in the account initially

   B. 0.98, the percent of money in the account after x years

   C. 5000, the amount of money in the account initially

   D. 5000, the amount of money in the account after x years

6. The tables below show the values of four different functions for given values of x.

x	$f(x)$
1	12
2	19
3	26
4	33

x	$g(x)$
1	−1
2	1
3	5
4	13

x	$h(x)$
1	9
2	12
3	17
4	24

x	$k(x)$
1	−2
2	4
3	14
4	28

   Which table represents a linear function?

   A. $f(x)$ B. $g(x)$ C. $h(x)$ D. $k(x)$

7. The table below represents the function F.

x	3	4	6	7	8
$F(x)$	9	17	65	129	257

   The equation that represents this function is

   A. $F(x) = 3^x$ B. $F(x) = 3x$

   C. $F(x) = 2^x + 1$ D. $F(x) = 2x + 3$

8. The function $V(t) = 1350(1.017)^t$ represents the value $V(t)$, in dollars, of a comic book t years after its purchase. The yearly rate of appreciation of the comic book is

   A. 17% B. 1.7%

   C. 1.017% D. 0.017%

9. A laboratory technician studied the population growth of a colony of bacteria. He recorded the number of bacteria every other day, as shown in the partial table below.

t **(time, in days)**	0	2	4
$f(t)$ **(bacteria)**	25	15,625	9,765,625

Which function would accurately model the technician's data?

A. $f(t) = 25^t$ B. $f(t) = 25^{t+1}$

C. $f(t) = 25t$ D. $f(t) = 25(t + 1)$

10. Which scenario represents exponential growth?

A. A water tank is filled at a rate of 2 gallons/minute.

B. A vine grows 6 inches every week.

C. A species of fly doubles its population every month during the summer.

D. A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

11. The equation $A = 1300(1.02)^7$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?

A. 0.02% decay B. 0.02% growth

C. 2% decay D. 2% growth

12. A student invests $500 for 3 years in a savings account that earns 4% interest per year. No further deposits or withdrawals are made during this time. Which statement does *not* yield the correct balance in the account at the end of 3 years?

A. $500(1.04)^3$

B. $500(1 - .04)^3$

C. $500(1 + .04)(1 + .04)(1 + .04)$

D. $500 + 500(.04) + 520(.04) + 540.8(.04)$

13. The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

A. $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$

B. $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$

C. $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$

D. $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

14. Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30,000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

A. It decreases 78% per year.

B. It decreases 22% per year.

C. It increases 78% per year.

D. It increases 22% per year.

15. For a recently released movie, the function $y = 119.67(0.61)^x$ models the revenue earned, y, in millions of dollars each week, x, for several weeks after its release.

Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

A. 37.27 B. 27.16 C. 17.06 D. 10.11

16. The range of the function defined as $y = 5^x$ is

A. $y < 0$ B. $y > 0$ C. $y \leq 0$ D. $y \geq 0$

17. The growth of a certain organism can be modeled by $C(t) = 10(1.029)^{24t}$, where $C(t)$ is the total number of cells after t hours. Which function is approximately equivalent to $C(t)$?

A. $C(t) = 240(.083)^{24t}$

B. $C(t) = 10(.083)^t$

C. $C(t) = 10(1.986)^t$

D. $C(t) = 240(1.986)^{\frac{t}{24}}$

18. Dylan invested \$600 in a savings account at a 1.6% annual interest rate. He made no deposits or withdrawals on the account for 2 years. The interest was compounded annually. Find, to the *nearest cent*, the balance in the account after 2 years.

19. Rhonda deposited \$3000 in an account in the Merrick National Bank, earning 4.2% interest, compounded annually. She made no deposits or withdrawals. Write an equation that can be used to find B, her account balance after t years.

20. The function, $t(x)$, is shown in the table below.

x	$t(x)$
-3	10
-1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

21. The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

22. Tanya is making homemade greeting cards. The data table below represents the amount she spends in dollars, $f(x)$, in terms of the number of cards she makes, x.

x	$f(x)$
4	7.50
6	9
9	11.25
10	12

Write a linear function, $f(x)$, that represents the data.

Explain what the slope and y-intercept of $f(x)$ mean in the given context.

23. The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.