Name: _____ Period: _____

Exponential Functions Test Review

Simplify the expression.

1. $(4x^3y^{-5})^4$

$\frac{256x^{12}}{y^{20}}$

2. $(-3a^3)^2(-2a^2)$

$(9a^6)(-2a^2)$

$-18a^8$

3. $\left(\frac{\cancel{18}^{6}}{\cancel{25}_{5}}a^{19}b^{10}\right)\left(\frac{\cancel{10}^{2}}{\cancel{21}_{7}}ab^2\right)$

$\frac{12}{35}a^{20}b^{12}$

4. $(250x^2y^6z^7)^{-3}$

$\frac{1}{250^3x^6y^{18}z^{21}}$

5. $\left(\frac{63a^{19}b^{10}c}{3^2a^{-1}b^5c}\right)$

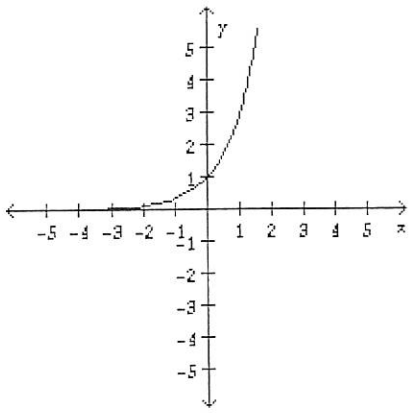
$7a^{20}b^5$

6. $\left(\frac{2p^6\cancel{p^0}s^{-2}}{6p^{-8}s^3}\right)$

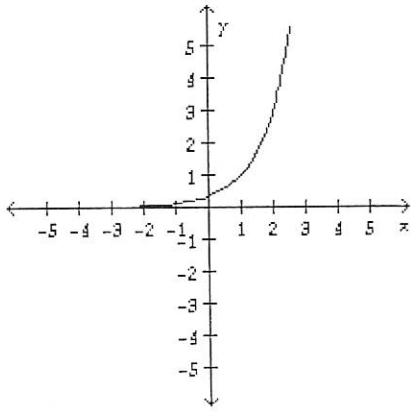
$\frac{p^{14}}{3s^5}$

7. Which graph represents the following equation, $f(x) = (3)^x - 1$

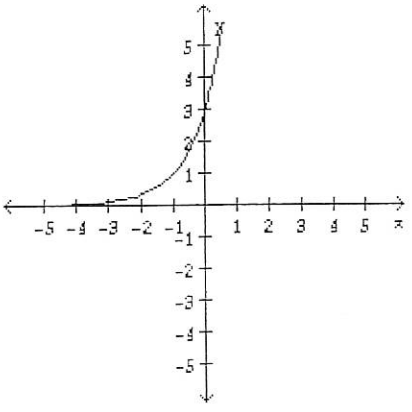
a.



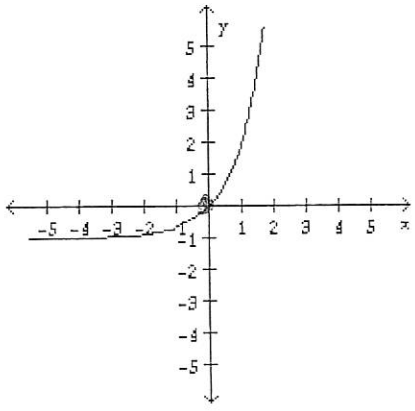
c.



b.

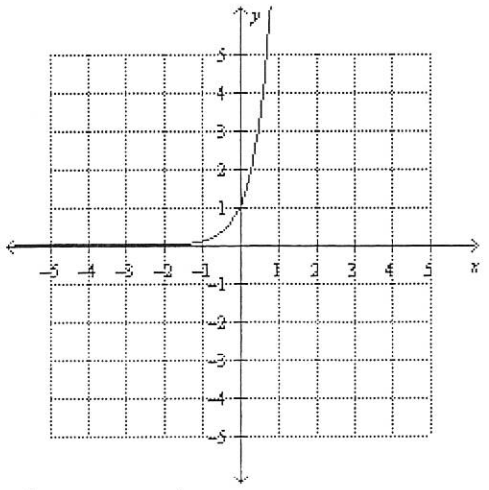


d.



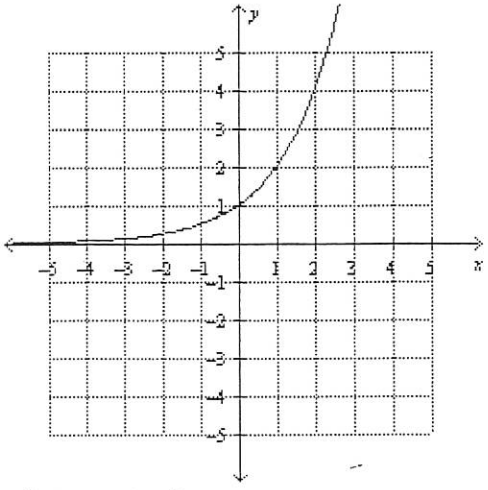
8. Which of the following shows the graph of $y = 5(2^x)$?

a.



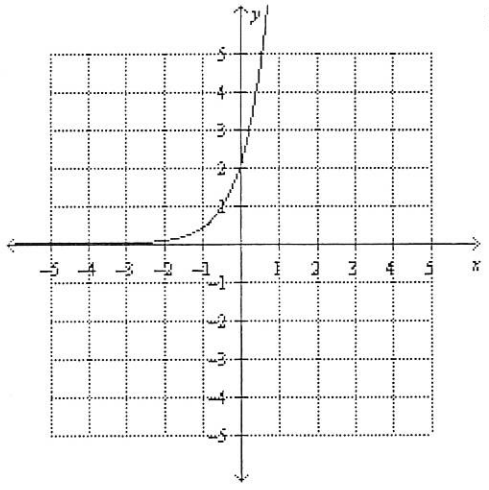
y-intercept = 1

c.



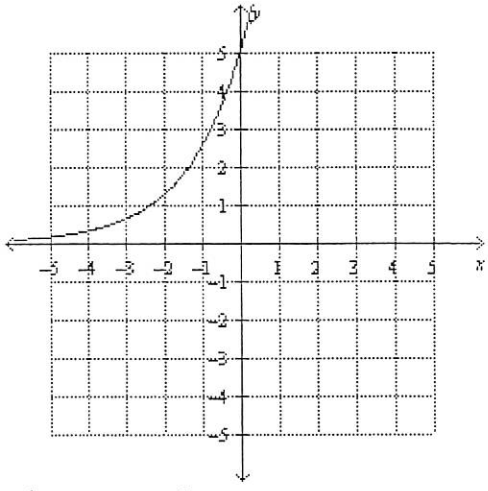
y-intercept = 1

b.



y-intercept = 2

d.

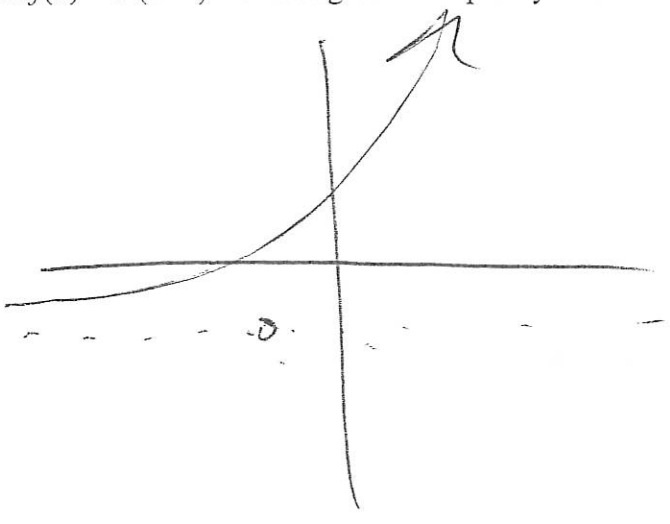


y-intercept = 5

9. State the domain and range of the function $f(x) = 3\,(2^{x+2}) - 3$ using both inequality and interval notation.

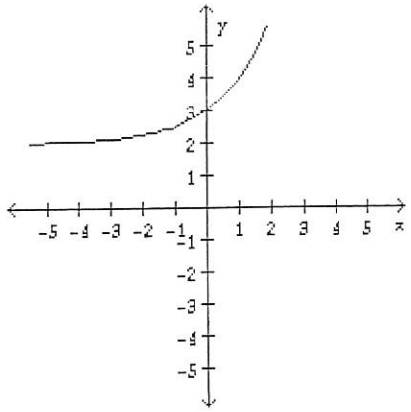
D: $(-\infty, \infty)$

R: $(-3, \infty)$

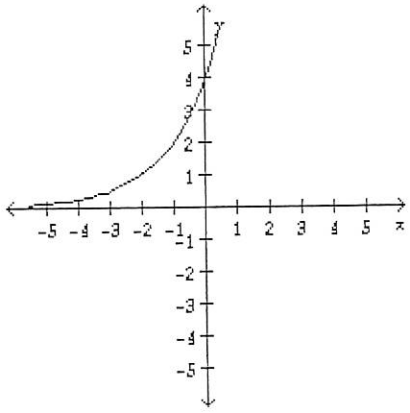


10. Choose the graph which matches the function. $f(x) = 2^{x+2}$

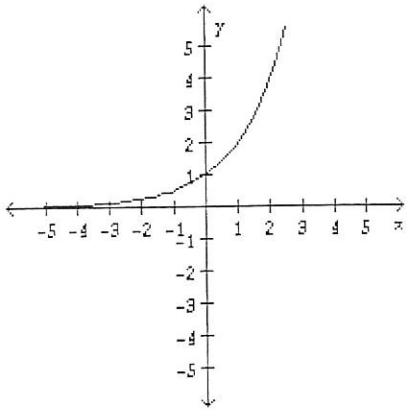
a.



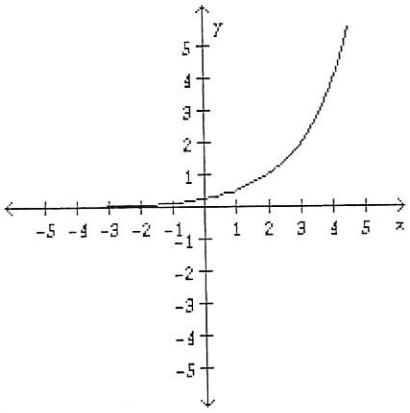
c.



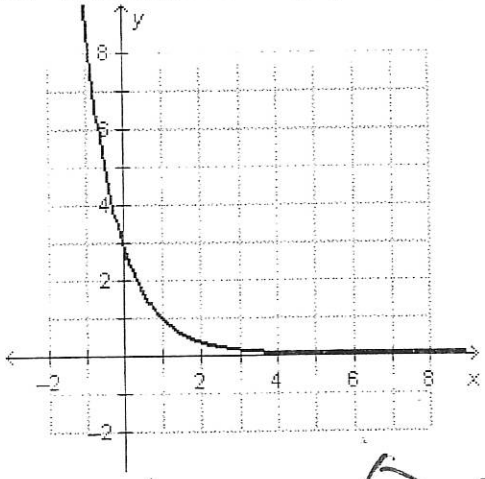
b.



d.



11. Which function is graphed below?



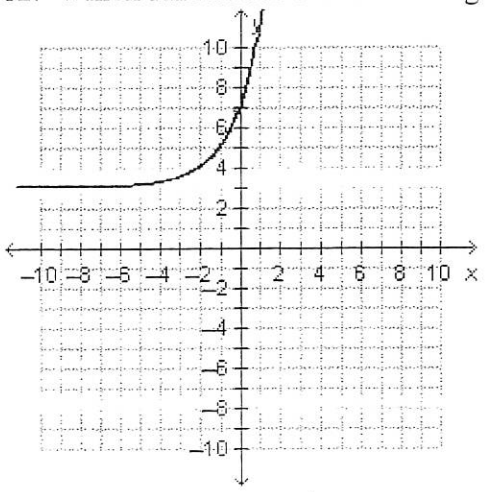
A. $y = \frac{1}{3}(3)^x$

B. $y = 3\left(\frac{1}{3}\right)^x$

C. $y = \left(\frac{1}{2}\right)^x + 2$

D. $y = (2)^x - 1$

12. Which function is shown in the graph below?



A. $y = 2^{x-2} + 3$ B. $y = 2^{x+2} + 3$ C. $y = 2^{x-3} + 2$ D. $y = 2^{x+3} + 2$

13. List the transformations for the following exponential equation: $y = -5 \cdot 3^{x+2} - 8$.

Left 2 Down 8 Stretch 5 flip over X-axis

14. Write an exponential growth equation that has an initial value of 2.

$2 \cdot \left(\frac{3}{2}\right)^x$

15. Write an exponential decay equation that has a range of $(3,\infty)$ and an initial value of 7.

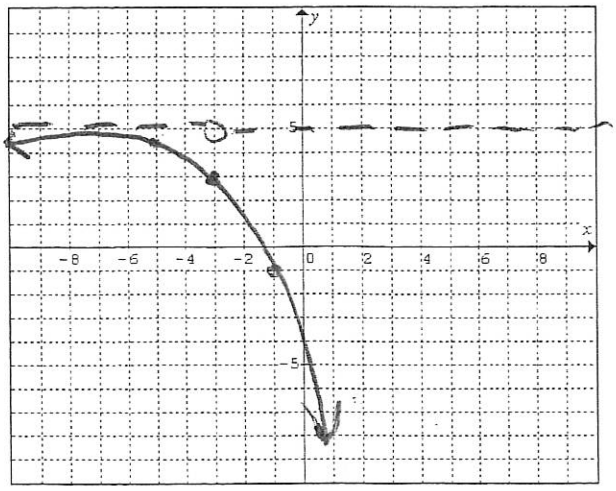
initial value → $7 \cdot \left(\frac{1}{3}\right)^x + 3$ ← ↑ decay

16. Graph $y = -2 \cdot 3^{\frac{1}{2}(x+3)} + 5$

x·2	y·-2
-1 = -2	$\frac{1}{3} = \frac{-3}{3}$
0 = 0	1 = -2
1 = 2	3 = -6

State the domain and range.

Asymptote equation: $y = 5$



17. Solve for a. $9 = \left(\frac{1}{27}\right)^{a+3}$

9

$3^2 = 3^{-3(a+3)}$

$2 = -3a - 9$

18. Solve for x. $4^x = \left(\frac{1}{8}\right)^{x+5}$

$2^{2x} = 2^{-3(x+5)}$

$2x = -3x - 15$

$5x = -15$

$x = -3$

19-21 Solve for x without a calculator.

19. $9^{x-1} - 2 = 25$

$9^{x-1} = 27$

$3^{2(x-1)} = 3^3$

$2x - 2 = 3$

$2x = 5$

$x = \frac{5}{2}$

20. $2^{x+4} - 12 = 20$

$2^{x+4} = 32$

$2^{x+4} = 2^5$

$x + 4 = 5$

$x = 1$

21. For what values of x does $25^x = 5^{x^2-3}$?

$5^{2x} = 5^{x^2-3}$

$2x = x^2 - 3$

$x^2 - 2x - 3 = 0$

$(x-3)(x+1) = 0$

$x = 3 \quad x = -1$

22. $y^{\frac{4}{5}} = 34$

a.	$y = 68$	c.	$y = 82.1$
b.	$y = 54$	d.	$y = 6.8$

23. Solve the equation $-2 = 3 - 7\sqrt[5]{x^2}$

$-5 = -7x^{\frac{2}{5}}$

$\left(\frac{5}{7}\right)^{5/2} = \left(x^{\frac{2}{5}}\right)^{5/2}$

a.	4.98	c.	3.87
b.	0.43, –0.43	d.	1.53, –1.53

24. Carlene is saving her money to buy a $500 desk. She deposits $400 into an account with an annual interest rate of 6% compounded continuously. The equation $400e^{0.06t} = 500$ represents the situation, where t is the number of years the money needs to remain in the account. About how long must Carlene wait to have enough money to buy the desk? Use a calculator and round your answer to the nearest whole number. (For now, use 2.718 for the value of e.)

a) 4 years
b) 7 years
c) 9 years
d) 20 years

$\frac{400e^{.06t}}{400} = \frac{500}{400}$

$e^{.06t} = \frac{5}{4}$

P r=.015 n=12

25. Isabel deposits $6,000 into an account that earns 1.5% interest compounded monthly. Assuming no more deposits and no withdrawals are made, how much money is in the account after 4 years?

t

Compound interest formula: $V(t) = P\left(1 - \frac{r}{n}\right)^{nt}$

$6000\left(1 + \frac{.015}{12}\right)^{12 \cdot 4}$

t = years since initial deposit
n = number of times compounded per year
r = annual interest rate (as a decimal)
P = initial (principal) investment
$V(t)$ = value of investment after t years

a) $6,360.00 b) $6,370.78 c) $7,180.89 d) $10,892.13

P= 2000 r=.12 n=4 t

26. A sum of money is invested at 12% compounded quarterly. About how long will it take for the amount of money to double?

4000=V(t)

Compound interest formula: $V(t) = P\left(1 - \frac{r}{n}\right)^{nt}$

$\frac{4000}{2000} = \frac{2000\left(1 + \frac{.12}{4}\right)^{4t}}{2000}$

$2 = \left(1 + \frac{.12}{4}\right)^{4x}$

y_1 y_2 intersect

t = years since initial deposit
n = number of times compounded per year
r = annual interest rate (as a decimal)
P = initial (principal) investment
$V(t)$ = value of investment after t years

a) 5.9 years b) 6.1 years c) 23.4 years d) 24.5 years

27. Otto deposited \$1,900 into an account that earns 4% interest compounded semiannually. After t years, he has \$3,875.79 in the account. Assuming he made no additional deposits or withdrawals, how long was the money in the account?

Compound interest formula: $V(t) = P\left(1 - \frac{r}{n}\right)^{nt}$

t = years since initial deposit
n = number of times compounded per year
r = annual interest rate (as a decimal)
P = initial (principal) investment
$V(t)$ = value of investment after t years

$3875.79 = 1900\left(1 + \frac{.04}{2}\right)^{2t}$

$2.0399 = \left(1 + \frac{.04}{2}\right)^{2t}$

$Y_1 \qquad Y_2$

intersect

a) 2 years
b) 9 years
c) 18 years
d) 36 years

28. A sum of money is invested at 12% compounded quarterly. About how long will it take for the amount of money to double?

Compound interest formula: $V(t) = P\left(1 - \frac{r}{n}\right)^{nt}$

$2P = P\left(1 + \frac{.12}{4}\right)^{4t}$

$2 = \left(1 + \frac{.12}{4}\right)^{4t}$

$Y_1 \qquad Y_2$

intersect

t = years since initial deposit
n = number of times compounded per year
r = annual interest rate (as a decimal)
P = initial (principal) investment
$V(t)$ = value of investment after t years

a) 5.9 years
b) 6.1 years
c) 23.4 years
d) 24.5 years

29. The general equation for depreciation is given by $y = A(1 - r)^t$, where y = current value, A = original cost, r = rate of depreciation, and t = time, in years. A car was purchased 6 years ago for \$25,000. If the annual depreciation rate is 11%, which equation can be used to determine the approximate current value of the car?

a) $y = 25{,}000(0.89)^6$ b) $y = (25{,}000 \cdot 0.11)^6$ c) $y = (25{,}000 \cdot 0.89)^6$ d) $y = 25{,}000(0.11)^6$

P

30. Joseph collected $100 from his relatives this year for his birthday. If he puts his money into an investment account that receives interest compounded quarterly at an annual rate of 2.5%, how much will be in the account in 8 years? 4

r .025 t

A. $122.06 B. $695.87 C. $105.11 D. $102.52

$$100\left(1+\frac{.025}{4}\right)^{4\cdot 8}$$

31. The population of a small town has been decreasing due to animal attacks in the area. The population was 5,600 in 1995 and has dropped to 3,242 in 2007. Assume that the population is decreasing exponentially.

(0, 5600) (12, 3242)

a) Write an exponential model for the population in this town in a particular year.

$y = a \cdot base^x$

$5600 = a \cdot base^0$

$a = 5600$

$y = 5600 \cdot$

$\frac{3242}{5600} = \frac{5600 \cdot base^{12}}{5600}$

$.5798 = b^{12}$

$.5798^{1/12} = b^{12}$ (1/12)

$b = .955$

$y = 5600 \cdot .955^x$

b) Use your model to predict the population in 2011.

$x = 16$

$y = 5600 \cdot .955^{16}$

$y = 2680.7$ partially eaten, maybe a leg or arm.

32. The yearly cost for residents to attend a state university increased from $5200 to $9000 in the last 5 years. Find the equation that models this situation and determine what the cost will be in 5 more years.

(0, 5200) (5, 9000)

$a = 5200$

$\frac{9000}{5200} = \frac{5200 \cdot b^5}{5200}$

$1.731 = b^5$

$1.731^{1/5} = b^5$ (1/5)

$b = 1.116$

$y = 5200 \cdot 1.116^x$