

Verse:

Name: key

Per:

# Practice Test: Exponential and Logarithmic Functions

(3.1 - 3.6)

\*Show your work\*

## Calculator okay for #1-10

Use the change of base rule to find the logarithm to four decimal places.

1)  $\log_6 0.525$

$$\frac{\log 0.525}{\log 6} = -0.3596$$

1) -0.3596

Use a calculator to find an approximate solution to the equation.

2)  $0.276e^{0.08x} = 0.000276$

$$\ln e^{0.08x} = \ln \frac{0.000276}{0.276}$$

$$x = \frac{\ln(0.001)}{0.08} = -86.346$$

2) -86.346

Solve the equation.

3)  $\log_6 x + \log_6(x-3) = 2$

$$\log(x(x-3)) = 2 \quad \log_6 x^2 - 3x = 2$$

$$6^2 = x^2 - 3x \quad x^2 - 3x - 36 = 0$$

$$x = \frac{3 \pm \sqrt{153}}{2} \quad x = \frac{3 + \sqrt{153}}{2} = 7.685$$

3) 7.685

Find the amount accumulated after investing a principal P for t years at an interest rate r.

4)  $P = \$1020, t = 11, r = 1\%$  compounded continuously

$$A = 1020 e^{0.01 \cdot 11} = \$1138.60$$

4) \$1,138.60

5)  $P = \$480, t = 4, r = 10\%$ , compounded quarterly

$$A = P \left(1 + \frac{r}{k}\right)^{kt} = 480 \left(1 + \frac{0.10}{4}\right)^{4(4)} = \$712.56$$

5) \$712.56

Solve the problem.

6) How long will it take for \$7200 to grow to \$24,500 at an interest rate of 2.2% if the interest is compounded quarterly? Round the number of years to the nearest hundredth.

$$24,500 = 7,200 \left(1 + \frac{0.022}{4}\right)^{4t} \quad \log 3.4027 = \log(1.0055)^{4t}$$

6) t = 55.82 yrs

7) Find the periodic payment of a loan with present value \$168,000 and an annual interest rate 8% for a term of 20 years, with payments made and interest charged 12 times per year.

$$168,000 = Q \left[ \frac{1 - \left(1 + \frac{0.08}{12}\right)^{-12 \cdot 20}}{0.08/12} \right] \quad Q = 1,405.22$$

7) \$1,405.22

8) Find the future value accumulated in an annuity after investing periodic payments of \$132 for 7 years at an annual interest rate of 7.25%, with payments made and credited 4 times per year.

$$FV = 132 \left[ \frac{\left(1 + \frac{0.0725}{4}\right)^{4 \cdot 7} - 1}{0.0725/4} \right] = \$4,760.02$$

8) \$4,760.02

9) The decay of 220 mg of an isotope is given by  $A(t) = 220e^{-0.016t}$ , where t is time in years. Find the amount left after 82 years.

$$220e^{-0.016(82)} = 59.24 \text{ mg}$$

9) 59.24 mg

10) The population of wolves in a state park after t years is modeled by the function

$$P(t) = \frac{600}{1 + 99e^{-0.3t}} \quad \text{When will the number of wolves be 150?}$$

10) 11.66 yrs

$$150 = \frac{600}{1 + 99e^{-0.3t}}$$

$$99e^{-0.3t} = 4 - 1 \quad t = \frac{\ln(1/33)}{-0.3}$$

$$150(1 + 99e^{-0.3t}) = 600$$

$$99e^{-0.3t} = 3$$

$$t = 11.66 \text{ yrs}$$

$$1 + 99e^{-0.3t} = \frac{600}{150}$$

$$e^{-0.3t} = \frac{3}{99}$$

$$\ln e^{-0.3t} = \ln(1/33)$$

**MULTIPLE CHOICE.**

Determine a formula for the exponential function.

11)

| x  | f(x)            |
|----|-----------------|
| -2 | 33              |
| -1 | 11              |
| 0  | $\frac{11}{3}$  |
| 1  | $\frac{11}{9}$  |
| 2  | $\frac{11}{27}$ |

A)  $f(x) = 11 \cdot 3^{-x} - 1$

B)  $f(x) = 11 \cdot 3^{-x}$

C)  $f(x) = 11 \cdot \left(\frac{1}{3}\right)^x$

D)  $f(x) = \frac{11}{3} \cdot 3^x$

Evaluate the logarithm.

12)  $\ln \frac{1}{\sqrt{e^9}}$

A)  $-\frac{9}{2}$

B)  $\frac{9}{2}$

C) -18

D) -9

13)  $\log_8(32)$

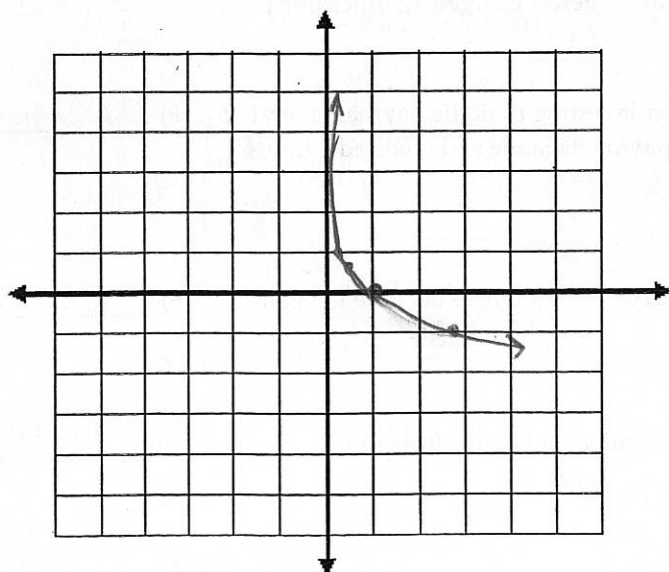
A)  $\frac{4}{3}$

B)  $\frac{3}{2}$

C)  $\frac{5}{4}$

D)  $\frac{5}{3}$

14) Graph  $y = -\ln x$



| x             | y          |
|---------------|------------|
| 0             | $\sqrt{x}$ |
| 1             | 0          |
| e             | -1         |
| $\frac{1}{e}$ | 1          |

Solve the equation.

15)  $4^{(10-2x)} = 256$

$4^{10-2x} = 4^4$

$10-2x = 4$   
 $-2x = -6$   
 $x = 3$

15)  $x = 3$

**MULTIPLE CHOICE.**

Solve the equation.

16)  $\log_5 x = -3$

A)  $x = \frac{1}{5^3}$

B)  $x = -(3)^5$

C)  $x = -\frac{3}{\log_5 3}$

D)  $x = -5 \cdot 3$

16) A

Find the exact solution to the equation.

17)  $125 \left( \frac{1}{5} \right)^{x/3} = 5$

A)  $x = 2$

B)  $x = 7$

C)  $x = \frac{2}{3}$

D)  $x = 6$

17) D

Rewrite the expression as a sum or difference or multiple of logarithms.

18)  $\log_5 \left( \frac{\sqrt[6]{19}}{s^2 r} \right)$

A)  $6 \log_5 19 - 2 \log_5 s - \log_5 6$

C)  $\frac{1}{6} \log_5 19 - 2 \log_5 s - 2 \log_5 r$

B)  $\log_5 19 - \log_5 s - \log_5 r$

D)  $\frac{1}{6} \log_5 19 - 2 \log_5 s - \log_5 r$

18) D

Solve the equation by changing it to exponential form.

19)  $\log x = 5.2$

A)  $x = 5.2^{10}$

B)  $x = -52$

C)  $x = 10^{5.2}$

D)  $x = 52$

19) C

Solve the equation.

20)  $\log 2x = \log 3 + \log (x - 4)$

$\log 2x = \log (3(x-4))$

$2x = 3x - 12$

$x - 12 = 0 \quad x = 12$

20)  $x = 12$

Use the product, quotient, and power rules of logarithms to rewrite the expression as a single logarithm. Assume that all variables represent positive real numbers.

21)  $3 \log_2 (3x + 8) + 2 \log_2 (4x - 2)$

$\log_2 (3x+8)^3 + \log_2 (4x-2)^2$

$\log_2 ((3x+8)^3 (4x-2)^2)$

21) \_\_\_\_\_

**MULTIPLE CHOICE.**

Compute the exact value of the function for the given x-value without using a calculator.

22)  $f(x) = \left( \frac{1}{5} \right)^x$  for  $x = -1$

A)  $-\frac{1}{5}$

B)  $\frac{1}{5}$

C)  $-5$

D)  $5$

$\frac{1^{-1}}{5^{-1}} = \frac{5^1}{1^1} = 5$

22) D

$$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

23)  $f(x) = 4^{1-x}$  for  $x = 3$

A)  $\frac{1}{8}$

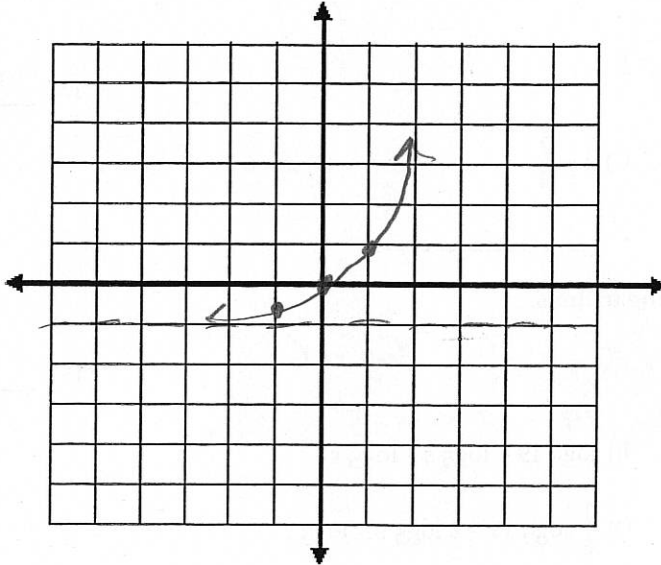
B)  $\frac{1}{16}$

C) -8

D) 16

23) B

24) Graph  $y = 2^x - 1$



| x  | y   |
|----|-----|
| 0  | 0   |
| 1  | 1   |
| -1 | -.5 |

# MULTIPLE CHOICE.

Solve the equation.

25)  $\log(4+x) - \log(x-2) = \log 3$

A)  $\frac{1}{2}$

B) 5

C) -5

D)  $\emptyset$

25) B

$$\log\left(\frac{4+x}{x-2}\right) = \log 3$$

$$\frac{4+x}{x-2} = 3$$

$$4+x = 3x-6$$

$$2x = 10$$

$$2x = 10$$

$$x = 5$$

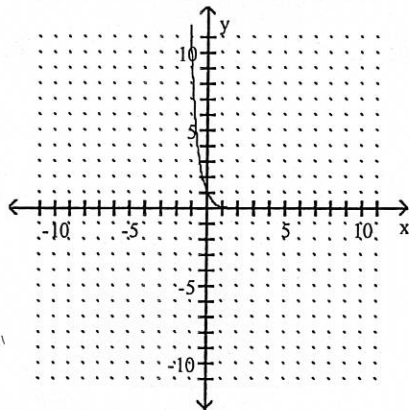
Match the graph with the function. Describe its position relative to the graph of the indicated basic function,

26)  $f(x) = 5 - 4^{-x}$ ; relative to  $f(x) = 4^x$

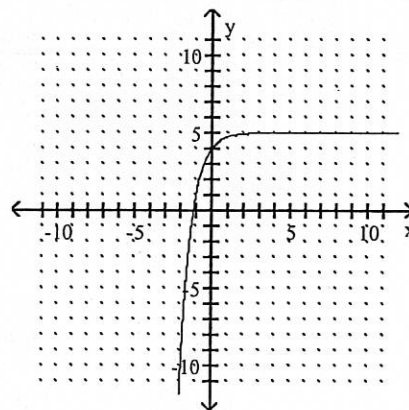
$-4^{-x} + 5$

- A) Reflected across y-axis;  
reflected across x-axis;  
moved down 5 unit(s)

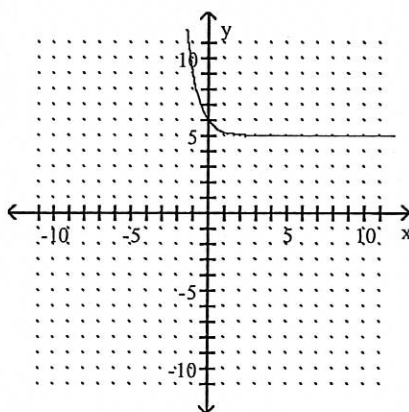
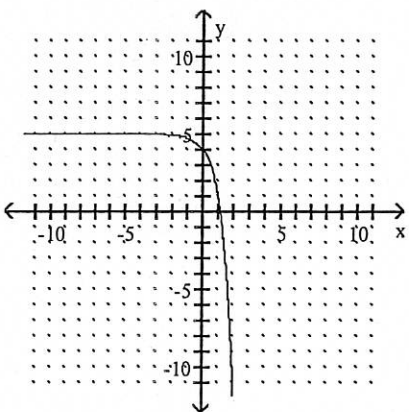
- B) Reflected across y-axis;  
reflected across x-axis;  
moved up 5 unit(s)



- C) Moved up 5 unit(s);  
reflected across y-axis;  
reflected across x-axis;



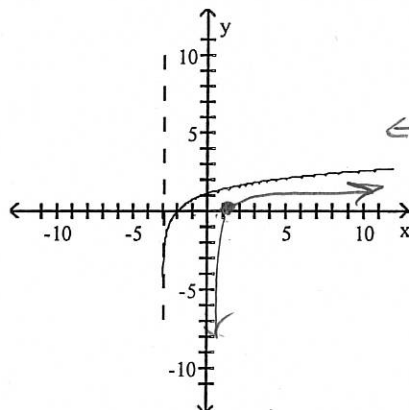
- D) Moved up 5 unit(s);  
reflected across y-axis;  
reflected across x-axis;



Determine the function which corresponds to the given graph.

27)

27) B



← shift left 3 units

A)  $y = \ln x - 3$

B)  $y = \ln(x + 3)$

C)  $y = \ln(x - 3)$

D)  $y = \ln x + 3$

1. The first part of the report is a general introduction to the subject.

2.

3. The second part of the report is a detailed description of the

4. The third part of the report is a discussion of the results of the

5. The fourth part of the report is a conclusion and a list of references.

6. The fifth part of the report is a summary of the main points of the

7. The sixth part of the report is a list of the names of the persons

8. The seventh part of the report is a list of the names of the

9. The eighth part of the report is a list of the names of the

10. The ninth part of the report is a list of the names of the

11. The tenth part of the report is a list of the names of the

12. The eleventh part of the report is a list of the names of the

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14. The twelfth part of the report is a list of the names of the

15. The thirteenth part of the report is a list of the names of the