

You must show your work in details to get credit.

Some Useful Formulas:

Compound interest formula:

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

Continuously compounded interest formula:

$$A = Pe^{rt}$$

Find all numbers that must be excluded from the domain of the rational expression.

1)  $\frac{x-8}{x^2+13x+40}$

A)  $x \neq 0$

B)  $x \neq 8$

C)  $x \neq 8, x \neq 5$

D)  $x \neq -8, x \neq -5$

1) \_\_\_\_\_

2)  $\frac{x-3}{x^2+8x+15}$

A)  $x \neq -3, x \neq -5$

B)  $x \neq 0$

C)  $x \neq 3, x \neq 5$

D)  $x \neq 3$

2) \_\_\_\_\_

Find the vertical asymptotes, if any, of the graph of the rational function.

3)  $h(x) = \frac{x}{x(x-4)}$

A)  $x = 0$  and  $x = -4$

C)  $x = 0$  and  $x = 4$

B)  $x = 4$

D) no vertical asymptote

3) \_\_\_\_\_

4)  $f(x) = \frac{x}{x^2+1}$

A)  $x = 1$

C)  $x = -1$

B)  $x = -1, x = 1$

D) no vertical asymptote

4) \_\_\_\_\_

5)  $\frac{x-4}{x^2-12x+27}$

A)  $x = -4$

C)  $x = 3, x = 9, x = -4$

B)  $x = -3, x = -9$

D)  $x = 3, x = 9$

5) \_\_\_\_\_

Find the horizontal asymptote, if any, of the graph of the rational function.

6)  $g(x) = \frac{5x^2-3x-6}{6x^2-4x+7}$

A)  $y = \frac{5}{6}$

C)  $y = 0$

B)  $y = \frac{3}{4}$

D) no horizontal asymptote

6) \_\_\_\_\_

7)  $f(x) = \frac{-15x}{5x^3+x^2+1}$

A)  $y = -\frac{1}{3}$

C)  $y = 0$

B)  $y = -3$

D) no horizontal asymptote

7) \_\_\_\_\_

Write the equation of the graph in its final position.

8) The graph of  $y = e^x$  is translated 6 units to the right and then 4 units upward.

A)  $y = e^{x+6} + 4$

B)  $y = e^{x-4} + 6$

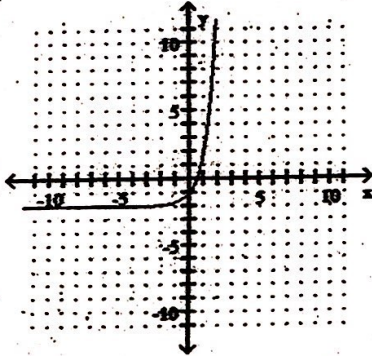
C)  $y = e^{x+4} + 6$

D)  $y = e^{x-6} + 4$

8) \_\_\_\_\_

The graph of an exponential function is given. Select the function for the graph from the functions listed.

9)



A)  $f(x) = 4^x$

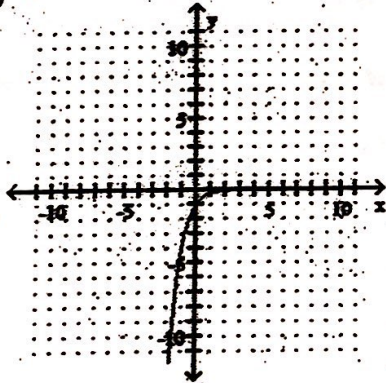
B)  $f(x) = 4^x - 2$

C)  $f(x) = 4^x - 2$

D)  $f(x) = 4^x + 2$

9) \_\_\_\_\_

10)



A)  $f(x) = -4^x$

B)  $f(x) = -4^{-x}$

C)  $f(x) = 4^{-x}$

D)  $f(x) = 4^x$

10) \_\_\_\_\_

Solve the problem.

11) Suppose that you have \$4000 to invest. Which investment yields the greater return over 9 years: 7.5% compounded continuously or 7.6% compounded semiannually?

11) \_\_\_\_\_

A) Both investment plans yield the same return.

B) \$4000 invested at 7.6% compounded semiannually over 9 years yields the greater return.

C) \$4000 invested at 7.5% compounded continuously over 9 years yields the greater return.

12) Suppose that you have \$10,000 to invest. Which investment yields the greater return over 7 years: 6.6% compounded monthly or 6.7% compounded quarterly?

12) \_\_\_\_\_

A) Both investment plans yield the same return.

B) \$10,000 invested at 6.6% compounded monthly over 7 years yields the greater return.

C) \$10,000 invested at 6.7% compounded quarterly over 7 years yields the greater return.

Solve the equation.

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

- A)  $\emptyset$  B)  $\{10\}$

C)  $\{-10\}$

D)  $\left\{\frac{1}{2}\right\}$

13) \_\_\_\_\_

14)  $\log_5(3x+5) = \log_5(3x+2)$

- A)  $\left\{\frac{7}{3}\right\}$  B)  $\{3\}$

C)  $\{0\}$

D)  $\emptyset$

14) \_\_\_\_\_

Simplify the expression.

15)  $8^{\log_8(6x)}$

- A) 8 B)  $8^6$

C) 1

D)  $6x$

15) \_\_\_\_\_

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

16)  $\log_{\pi} 6$

- A) 0.6389 B) 0.2810

C) 1.5652

D) 1.2753

16) \_\_\_\_\_

17)  $\log_{13} 47$

- A) 2.7860 B) 0.5582

C) 0.6662

D) 1.5011

17) \_\_\_\_\_

Solve the equation.

18)  $9^{3x-12} = (3)^{2x}$

- A) 12 B) -12

C) -6

D) 6

18) \_\_\_\_\_

Solve the exponential equation. Express the solution set in terms of natural logarithms.

19)  $4^{x+4} = 5^{2x+5}$

A)  $\{\ln 5 - \ln 4\}$

B)  $\left\{\frac{5 \ln 5 - 4 \ln 4}{\ln 4 - 2 \ln 5}\right\}$

C)  $\{7 \ln 5 - 5 \ln 4\}$

D)  $\left\{\ln \left[\frac{5^5}{4^4} - \frac{4}{5^2}\right]\right\}$

19) \_\_\_\_\_

Solve the equation by expressing each side as a power of the same base and then equating exponents.

20)  $3(3x+6) = \frac{1}{27}$

A)  $\left\{\frac{1}{9}\right\}$

B)  $\{3\}$

C)  $\{-3\}$

D)  $\{9\}$

20) \_\_\_\_\_

21)  $e^{x+3} = \frac{1}{e^2}$

A)  $\{-1\}$

B)  $\{5\}$

C)  $\{-5\}$

D)  $\{1\}$

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

Solve the equation. Round your answer to three decimal places.

22)  $3^{(x-2)} = 9$

A) 4800

B) -1.635

C) 3.588

D) 4

22) \_\_\_\_\_

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

23)  $4e^x = 17$

A) -1.45

B) -0.63

C) 0.63

D) 1.45

23) \_\_\_\_\_

Rewrite the expression as a single logarithm.

24)  $6 \log_m(y) - 3 \log_m(x^2)$

A)  $\log_m \left( \frac{y^6}{x^5} \right)$

B)  $\log_m \left( \frac{6y}{3x^2} \right)$

C)  $\log_m \left( \frac{y^6}{2x^3} \right)$

D)  $\log_m \left( \frac{y^6}{x^6} \right)$

24) \_\_\_\_\_

25)  $\frac{1}{2}(\log_7(r-2) - \log_7 r)$

A)  $\log_7 \sqrt{\frac{r-2}{2r}}$

B)  $\log_7 \sqrt{\frac{r-2}{r}}$

C)  $\log_7 \frac{r-2}{\sqrt{r}}$

D)  $\log_7 \frac{\sqrt{r-2}}{r}$

25) \_\_\_\_\_

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

26)  $\log_3 \left( \frac{x^9 y^8}{7} \right)$

A)  $9 \log_3(x) + 8 \log_3(y) - \log_3(7)$

C)  $(9 \log_3(x))(8 \log_3(y)) - \log_3(7)$

B)  $9 \log_3(x) - 8 \log_3(y) - \log_3(7)$

D)  $9 \log_3(x) + 8 \log_3(y) + \log_3(7)$

26) \_\_\_\_\_

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

27)  $\log_3 \left( \frac{x^3}{y^8} \right)$

A)  $3 \log_3 x - 8 \log_3 y$

C)  $3 \log_3 x + 8 \log_3 y$

B)  $8 \log_3 y - 3 \log_3 x$

D)  $\frac{3}{8} \log_3 \left( \frac{x}{y} \right)$

27) \_\_\_\_\_

28)  $\log_{13} \left( \frac{8 \sqrt{11}}{y^2 x} \right)$

A)  $\frac{1}{8} \log_{13} 11 - 2 \log_{13} y - \log_{13} x$

C)  $8 \log_{13} 11 - 2 \log_{13} y - \log_{13} 8$

B)  $\frac{1}{8} \log_{13} 11 - 2 \log_{13} y - 2 \log_{13} x$

D)  $\log_{13} 11 - \log_{13} y - \log_{13} x$

28) \_\_\_\_\_

Use properties of logarithms to expand the logarithmic expression as much as possible.

29)  $\log_5 \left( \frac{x+5}{x^4} \right)$

A)  $\log_5(x+5) - \log_5 x$

C)  $\log_5(x+5) - 4 \log_5 x$

B)  $\log_5(x+5) + 4 \log_5 x$

D)  $4 \log_5 x - \log_5(x+5)$

29) \_\_\_\_\_

30)  $\log_w \left( \frac{7x}{4} \right)$

A)  $\log_w 7 + \log_w x + \log_w 4$

C)  $\log_w 7 + \log_w x - \log_w 4$

B)  $\log_w 7x - \log_w 4$

D)  $\log_w 3x$

30) \_\_\_\_\_

You must solve each question by showing your work in details in order to get credit. At the end make a summary of all your answers in a table like the one below:

Quest. #	Answer	Quest. #	Answer	Quest. #	Answer
1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	

P.S. No work show  $\equiv$  No Credit.