Free-Response: (*Total 16 points*...exact points are listed in *italics* in the problem.)
You must show a reasonable amount of work that leads to your answer. Where it is impossible to show work, explain the mental leaps that you made to draw your conclusion. Write your final answer in the "answer" box. Mark all extraneous answers as such.

29. $\log_3(2x-5) = \log_3(16-x)$ *(3 points)*

30. $\log_2(x^2 - 2x) = \log_2(2x-3)$ *(5 points)*

31. $3\log_2(5x+1) + 1 = 13$ *(5 points)*

32. $\log_5 x - \log_5 6 = \log_5 8$ *(3 points)*

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Evaluate the logarithm.

1) $\log_2(\frac{1}{2})$ 1) _____

    A) –1   B) 1   C) 2   D) 0

2) $\ln e^7$ 2) _____

    A) 7   B) e^7 C) 1   D) 7 ln e

3) $\log_8(32)$ 3) _____

    A) $\frac{5}{3}$ B) $\frac{4}{3}$ C) $\frac{5}{4}$ D) $\frac{3}{2}$

Simplify the expression.

4) $\log_3 3^2$ 4) _____
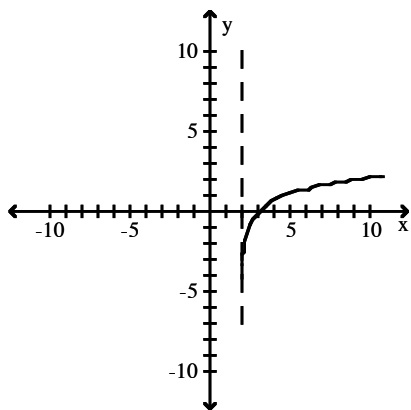
    A) 9   B) 2   C) 6   D) 3

5) $4^{\log_4 22}$ 5) _____

    A) 1.759218604e+13   B) 88
    C) 4   D) 22

6) $e^{\ln 8}$ 6) _____

    A) e^8 B) $\frac{1}{8}$ C) 8   D) ln 8

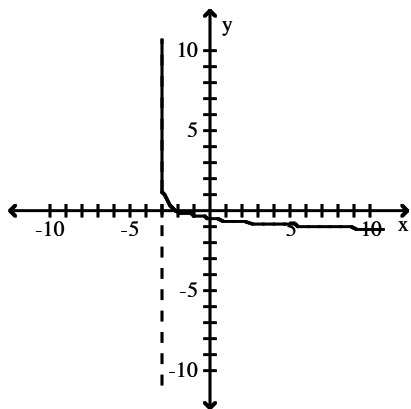**Determine the function which corresponds to the given graph.**

7)   7) _____

The asymptote is x = 2.

    A) y = ln x – 2   B) y = ln x + 2   C) y = ln(x – 2)   D) y = ln(x + 2)

8)

The asymptote is x = –3

    A) $y = \log(3 - x)$ B) $y = -\log(x + 3)$

    C) $y = \log(x + 3)$ D) $y = -\log(x - 3)$

8) _____

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

9) $\log_6 (xy)$

    A) $\log_3 x - \log_3 y$ B) $\log_6 x + \log_6 y$

    C) $\log_6 x - \log_6 y$ D) $\log_3 x + \log_3 y$

9) _____

10) $\log_2 \left(\dfrac{x4\ y2}{5} \right)$

    A) $(4 \log_2 x)(2 \log_2 y) - \log_2 5$ B) $4 \log_2 x + 2 \log_2 y - \log_2 5$

    C) $4 \log_2 x - 2 \log_2 y - \log_2 5$ D) $4 \log_2 x + 2 \log_2 y + \log_2 5$

10) _____

11) $\log \sqrt[4]{\dfrac{x}{y}}$

    A) $\log \left(\dfrac{x}{4} \right) - \log \left(\dfrac{y}{4} \right)$ B) $\dfrac{1}{4}\log x - \dfrac{1}{4}\log y$

    C) $\dfrac{\log \left(\sqrt[4]{x} \right)}{\log \left(\sqrt[4]{y} \right)}$ D) $\dfrac{\log x}{\log y}$

11) _____

12) $\log_{10} \left(\dfrac{3\sqrt{x}}{y} \right)$

    A) $\log_{10} (3\sqrt{x}) - \log_{10} y$ B) $\log_{10} 3 + \dfrac{1}{2} \log_{10} x - \log_{10} y$

    C) $\log_{10} 3 \cdot \dfrac{1}{2} \log_{10} x \div \log_{10} y$ D) $\log_{10} y - \log_{10} 3 - \dfrac{1}{2} \log_{10} x$

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.

13) $\log_3 13 - \log_3 z$

13) _____

    A) $\log_6 13/z$ B) $\log_3 13/z$ C) $\log_3 (13 - z)$ D) $\log_3 z/13$

14) $5 \log_4 (6x + 6) + 4 \log_4 (3x + 4)$

14) _____

    A) $\log_4 (6x + 6)^5(3x + 4)^4$ B) $\log_4 ((6x + 6)^5 + (3x + 4)^4)$

    C) $\log_4 \dfrac{(6x + 6)^5}{(3x + 4)^4}$ D) $20 \log_4 (6x + 6)(3x + 4)$

15) $2 \log_m p - 6 \log_m x^2$

15) _____

    A) $\log_m \dfrac{p^2}{x^8}$ B) $\log_m \dfrac{p^2}{x^{12}}$ C) $\log_m \dfrac{2p}{6x^2}$ D) $\log_m \dfrac{p^2}{2x^6}$

16) $3\log x + 5\log y$

16) _____

    A) $\log(15xy)$ B) $\log(x^3 + y^5)$ C) $\log (x^3 y^5)$ D) $\log(3x + 5y)$

Write the expression using only the indicated logarithms.

17) $\log_7 x$ using natural logarithms

17) _____

    A) $\dfrac{\ln x}{\ln 7}$ B) $\dfrac{\ln 7}{\ln x}$ C) $\ln x + \ln 7$ D) $\ln x \cdot \ln 7$

18) $\log_{1/9} (a - b)$ using natural logarithms

18) _____

    A) $-\dfrac{\ln (a - b)}{\ln 9}$ B) $\dfrac{1}{\ln 9}$ C) $\dfrac{\ln 9}{\ln (a - b)}$ D) $\dfrac{\ln (a - b)}{\ln 9}$

Solve the equation by changing it to exponential form.

19) $\log_9 x = -3$

19) _____

    A) $x = -\dfrac{3}{\log_9 3}$ B) $x = -9 \cdot 3$ C) $x = \dfrac{1}{9^3}$ D) $x = -(3)^9$

Find the exact solution to the equation.

20) $6 - \log_5(x + 7) = 5$

20) _____

    A) $x = -4$ B) $x = 2$ C) $x = -2$ D) $x = 12$

21) $5 \ln (x - 6) = 1$

21) _____

    A) $x = e^{1/5} - 6$ B) $x = 5e + 6$ C) $x = e^{1/5} + 6$ D) $x = e^5 + 6$

22) $3(6 - 3x) = \dfrac{1}{27}$

22) _____

A) $x = \dfrac{1}{9}$ B) x = –3   C) x = 3   D) x = 9

Find the domain of the function.

23) f(x) = log (x – 2)

23) _____

A) (2, ∞)   B) (–2, ∞)   C) (1, ∞)   D) (0, ∞)

24) f(x) = ln (3 – x)

24) _____

A) (–3, ∞)   B) (–∞, 3)   C) (3, ∞)   D) (–∞, –3)

Solve the equation.

25) log (x – 9) = 1 – log x

25) _____

A) 10   B) –10   C) –1, 10   D) –10, 1

26) log 5x = log 4 + log (x + 3)

26) _____

A) –12   B) $\dfrac{4}{3}$ C) $\dfrac{7}{4}$ D) 12

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

27) P = $4000, t = 4, r = 7% compounded continuously

27) _____

A) $7083.18   B) $23,018.41   C) $5292.52   D) $41,249.03

28) P = $1,000, t = 6, r = 15%, compounded semiannually (k = 2)

28) _____

A) $2313.06   B) $1381.78   C) $2381.78   D) $2215.61

1) A
2) A
3) A
4) B
5) D
6) C
7) C
8) B
9) B
10) B
11) B
12) B
13) B
14) A
15) B
16) C
17) A
18) A
19) C
20) C
21) C
22) C
23) A
24) B
25) A
26) D
27) C
28) C