Integrated Math 3 Honors Final Exam Review (Semester 1)

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

1) $\log_4 (x + 3) + \log_4 (x - 3) = 2$

2) $\log_6 (5x - 5) = \log_6 (3x + 7)$

3) $\ln \sqrt{x + 1} = 7$

4) $\log_3 (x - 1) = -1$

5) $\log_5 (x + 2) - \log_5 x = 2$

Write the equation in its equivalent exponential form.

6) $\log_b 64 = 2$

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

7) $\log_5 \left(\frac{7}{13}\right)$

8) $\log_5 \left(\frac{\sqrt[3]{m}\sqrt[7]{n}}{k^2}\right)$

9) $\log_2 (8x)$

10) $\log_4 \left(\frac{x - 6}{x^5}\right)$

11) $\log_7 \sqrt[4]{y}$

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

12) $f(x) = \frac{8x}{2x^2 + 1}$

13) $h(x) = \frac{10x^3}{5x^2 + 1}$

14) $g(x) = \frac{10x^2}{2x^2 + 1}$

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

15) $16^{x + 6} = 64^{x - 8}$

16) $2^{(7 - 3x)} = \frac{1}{4}$

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

17) $5^{x + 7} = 3$

Find a rational zero of the polynomial function and use it to find all the zeros of the function.

18) $f(x) = 3x^3 - x^2 - 9x + 3$

19) $f(x) = 2x^3 - 9x^2 + 7x + 6$

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

Find the zeros for the polynomial function and give the multiplicity for each zero. State whether the graph crosses the x-axis or touches the x-axis and turns around, at each zero.

20) $f(x) = x^3 + x^2 - 42x$ 20) _____

A) 0, multiplicity 1, crosses the x-axis
7, multiplicity 1, crosses the x-axis
-6, multiplicity 1, crosses the x-axis

B) 0, multiplicity 1, crosses the x-axis
- 7, multiplicity 1, crosses the x-axis
6, multiplicity 1, crosses the x-axis

C) - 7, multiplicity 2, touches the x-axis and turns around
6, multiplicity 1, crosses the x-axis

D) 0, multiplicity 1, touches the x-axis and turns around;
- 7, multiplicity 1, touches the x-axis and turns around;
6, multiplicity 1, touches the x-axis and turns around

21) $f(x) = 5(x - 5)(x + 3)^2$ 21) _____

A) -5, multiplicity 1, touches x-axis and turns around; 3, multiplicity 2, crosses x-axis

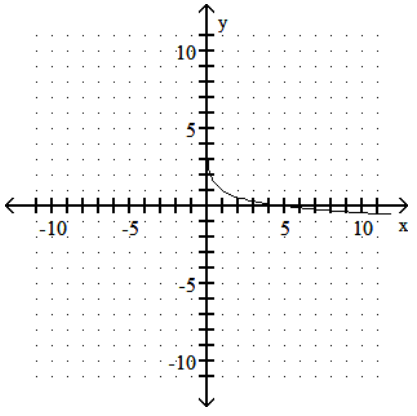
B) 5, multiplicity 1, touches x-axis and turns around; -3, multiplicity 2, crosses x-axis

C) 5, multiplicity 1, crosses x-axis; -3, multiplicity 2, touches x-axis and turns around

D) -5, multiplicity 1, crosses x-axis; 3, multiplicity 2, touches x-axis and turns around

The graph of a logarithmic function is given. Select the function for the graph from the options.

22) 22) _____



A) $f(x) = \log_5 x$

B) $f(x) = \log_5 (-x)$

C) $f(x) = -\log_5 x$

D) $f(x) = 1 - \log_5 x$

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

23) $5 \ln x - \frac{1}{3} \ln y$

24) $3 \log_4 2 + \frac{1}{7} \log_4 (r - 6) - \frac{1}{2} \log_4 r$

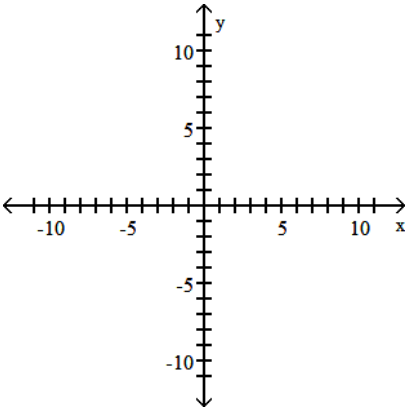
Find the inverse of the one-to-one function.

25) $f(x) = (x + 3)^3$

26) $f(x) = \frac{5}{7x - 8}$

Use transformations of $f(x) = \frac{1}{x}$ or $f(x) = \frac{1}{x^2}$ to graph the rational function.

27) $f(x) = \frac{1}{x - 3} + 4$

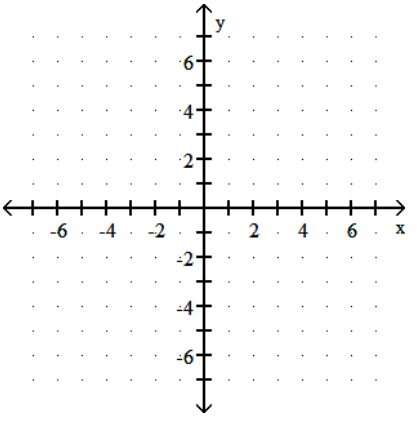


Find the domain of the rational function.

28) $h(x) = \frac{x + 8}{x^2 - 4}$

Graph the function.

29) Use the graph of $f(x) = e^x$ to obtain the graph of $g(x) = e^{x - 2} + 1$.



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

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

Use the Rational Zero Theorem to list all possible rational zeros for the given function.

31) $f(x) = -2x^3 + 4x^2 - 2x + 8$

Evaluate the expression without using a calculator.

32) $e^{\ln 153}$

33) $\log_{64} 4$

34) $\log_2 \frac{1}{4}$

Divide using long division.

35) $(11x^2 + 82x + 35) \div (x + 7)$

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

Use the Leading Coefficient Test to determine the end behavior of the polynomial function.

36) $f(x) = (x + 2)(x + 3)(x + 5)^3$ 36) _____

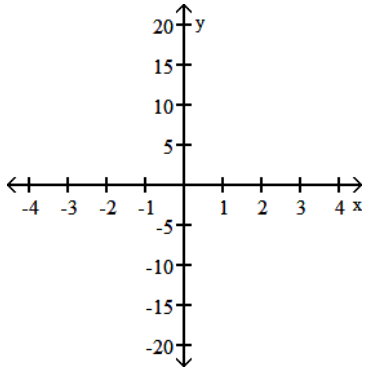
A) rises to the left and rises to the right
B) falls to the left and rises to the right
C) rises to the left and falls to the right
D) falls to the left and falls to the right

37) $f(x) = (x - 5)(x - 4)(x - 3)^2$ 37) _____

A) falls to the left and falls to the right
B) rises to the left and falls to the right
C) falls to the left and rises to the right
D) rises to the left and rises to the right

Graph the polynomial function.

38) $f(x) = -x^2(x - 4)(x - 1)$



Divide using synthetic division.

39) $(x^2 + 15x + 52) \div (x + 9)$

Find the domain of the logarithmic function.

40) $f(x) = \ln (7 - x)$

Solve the problem.

41) Solve the equation $12x^3 - 65x^2 + 24x + 10 = 0$ given that $\frac{2}{3}$ is a root.

For the given functions f and g , find the indicated composition.

42) $f(x) = x^2 - 2x - 5$, $g(x) = x^2 + 2x + 3$
$(f \circ g)(-3)$

43) $f(x) = 4x^2 + 2x + 5$, $g(x) = 2x - 4$
$(g \circ f)(x)$

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

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

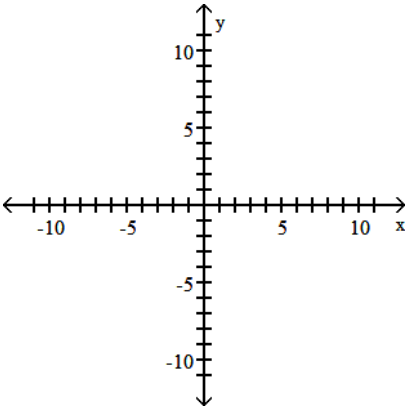
45) $\frac{x - 81}{x^2 - 8x + 15}$

Find the zeros of the polynomial function.

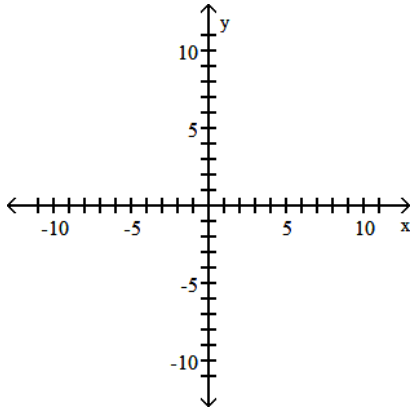
46) $f(x) = x^3 + 5x^2 - 4x - 20$

Graph the rational function.

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



48) $f(x) = \dfrac{4x^2}{x^2 - 1}$



Write the equation in its equivalent logarithmic form.

49) $\sqrt[3]{343} = 7$

Solve the rational inequality. Express the solution set in interval notation.

50) $\dfrac{x + 26}{x + 5} < 5$