St Ambrose University
Department of Mathematics
Math 151 Final Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question(5 pts each). NO CALCULATORS OF ANY KIND ALLOWED.

Solve the equation.

1) $x(4x - 3) = (4x + 1)(x - 3)$ 1) _____

A) $\{-\frac{1}{3}\}$ B) $\{4\}$ C) $\{-\frac{3}{8}\}$ D) $\{-3\}$

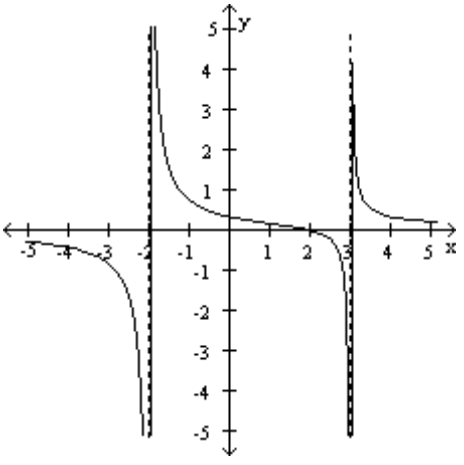
Solve the equation by factoring.

2) $x(x - 11) + 30 = 0$ 2) _____

A) $\{6, -5\}$ B) $\{-6, -5\}$ C) $\{6, 5\}$ D) $\{-6, 5\}$

Solve the problem.

3) Decide which of the rational functions might have the given graph. 3) _____



A) $R(x) = \frac{x + 2}{(x - 2)(x + 3)}$ B) $R(x) = \frac{x - 2}{(x + 2)(x - 3)}$

C) $R(x) = \frac{2 - x}{(x + 2)(x - 3)}$ D) $R(x) = \frac{x - 2}{(x + 2)^2(x - 3)^2}$

Solve the equation in the complex number system.

4) $x^4 - 6x^2 - 7 = 0$ 4) _____

A) $\{-\sqrt{7}, \sqrt{7}, i, -i\}$ B) $\{\sqrt{7}i, i\}$ C) $\{\sqrt{7}, 7\}$ D) $\{-\sqrt{7}i, -i\}$

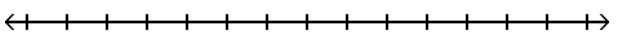
Find the real solutions of the equation.

5) $\sqrt[3]{5x + 1} = 5$ 5) _____

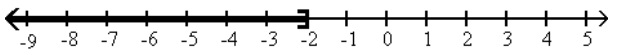
A) $\{\frac{24}{5}\}$ B) $\{\frac{124}{5}\}$ C) $\{24\}$ D) $\{25\}$

Solve the inequality. Express your answer using interval notation. Graph the solution set.

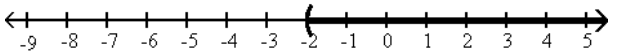
6) $-4(5x - 1) < -24x - 4$ 6) _____



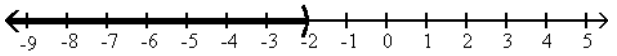
A) $(-\infty, -2]$



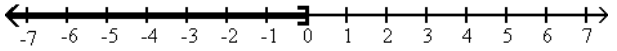
B) $(-2, \infty)$



C) $(-\infty, -2)$



D) $(-\infty, -0]$



Find the distance $d(P_1, P_2)$ between the points P_1 and P_2.

7) $P_1 = (4, -2)$; $P_2 = (0, 1)$ 7) _____

A) 25 B) 10 C) 6 D) 5

Solve the problem.

8) Find the slope-intercept form of the equation of the line containing the points $(6, -5)$ and $(-5, 3)$. 8) _____

A) $y = mx - \frac{7}{11}$ B) $y = -\frac{8}{11}x - \frac{7}{11}$

C) $y + 5 = -\frac{8}{11}(x - 6)$ D) $y = \frac{8}{11}x - \frac{7}{11}$

Find an equation for the line with the given properties.

9) Perpendicular to the line $-5x - y = 7$; containing the point $(0, -\frac{7}{5})$ 9) _____

A) $y = -\frac{1}{5}x - \frac{7}{5}$ B) $y = -\frac{6}{5}$ C) $y = \frac{1}{5}x + 7$ D) $y = \frac{1}{5}x - \frac{7}{5}$

Form a polynomial whose zeros and degree are given.

10) Zeros: $-3, -2, 2$; degree 3 10) _____

A) $f(x) = x^3 + 3x^2 - 4x - 12$ for $a = 1$ B) $f(x) = x^3 + 3x^2 + 4x + 12$ for $a = 1$

C) $f(x) = x^3 - 3x^2 - 4x + 12$ for $a = 1$ D) $f(x) = x^3 - 3x^2 + 4x - 12$ for $a = 1$

Find the domain of the rational function.

11) $f(x) = \frac{x + 8}{x^2 - 9}$ 11) _____

A) $\{x \mid x \neq 0, x \neq 9\}$ B) $\{x \mid x \neq -3, x \neq 3, x \neq -8\}$

C) all real numbers D) $\{x \mid x \neq -3, x \neq 3\}$

List the potential rational zeros of the polynomial function. Do not find the zeros.

12) $f(x) = 7x^4 - x^2 + 2$ 12) _____

A) $\pm\frac{1}{7}, \pm\frac{2}{7}, \pm 1, \pm 2, \pm 7$ B) $\pm\frac{1}{7}, \pm\frac{1}{2}, \pm 1, \pm 2, \pm 7$

C) $\pm\frac{1}{7}, \pm\frac{2}{7}, \pm 1, \pm 2$ D) $\pm\frac{1}{2}, \pm\frac{7}{2}, \pm 1, \pm 7$

Solve the equation.

13) $2^{x^2 - 3} = 64$ 13) _____

A) $\sqrt{35}, -\sqrt{35}$ B) 3, -3 C) 3 D) 6

Write as the sum and/or difference of logs. Express powers as factors.

14) $\log_{19} \frac{\sqrt[3]{14}}{q^2 p}$ 14) _____

A) $3 \log_{19} 14 - 2 \log_{19} q - \log_{19} 3$ B) $\frac{1}{3} \log_{19} 14 - 2 \log_{19} q - \log_{19} p$

C) $\frac{1}{3} \log_{19} 14 - 2 \log_{19} q - 2 \log_{19} p$ D) $\log_{19} 14 - \log_{19} q - \log_{19} p$

Solve the equation.

15) Find all real solutions of the following equation. 15) _____

$\log_3 x + \log_3(x - 24) = 4$

A) no real solutions B) $x = -3, 27$

C) x = 53 D) x = 27

16) $\log_x(9)=2$ 16) _____

A) x=3, x=-3 B) x=-3 C) x=3 D) x=0

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

17) $2 \ln e^{4.2}$ 17) _____

A) 2.1 B) 8.4 C) 4.2 D) $e^{8.4}$

Find the indicated composite for the pair of functions.

18) $(g \circ f)(x)$: $f(x) = 4x^2 + 3x + 5$, $g(x) = 3x - 7$ 18) _____

A) $4x^2 + 3x - 2$ B) $4x^2 + 9x + 8$ C) $12x^2 + 9x + 8$ D) $12x^2 + 9x + 22$

Solve the system of equations by elimination.

19) 19) _____

$$\begin{cases} 2x + 24y = -154 \\ 8x + 4y = 28 \end{cases}$$

A) x = -4, y = 7 B) x = 8, y = -8 C) x = 7, y = -7 D) x = -7, y = 7

Solve the system of equations by substitution.

20) 20) _____

$$\begin{cases} x + y = 1 \\ x + y = -9 \end{cases}$$

A) x = 0, y = -8 B) x = 1, y = -9 C) x = 0, y = 0 D) inconsistent

Verify that the values of the variables listed are solutions of the system of equations.

21) 21) _____

$$\begin{cases} x + y + z = -8 \\ x - y + 2z = -1 \\ 4x + y + z = -17 \end{cases}$$

x = -1, y = -4, z = -3

A) solution B) not a solution