Part A (Algebra / MTH100)
Sample Questions

Find the square.

1) $(w - 14)^2$

A) $196w^2 - 28w + 196$
B) $w^2 - 28w + 196$
C) $w + 196$
D) $w^2 + 196$

Simplify the expression. Use positive exponents. Assume variables represent nonzero real numbers.

2) $(-5p)^2(-5p)^8$

A) $-5^{10}p^{10}$
B) $5^{10}p$
C) $25p^{10}$
D) $5^{10}p^{10}$

Factor as completely as possible. If unfactorable, indicate that the polynomial is prime.

3) $10z^2 + 11z - 6$

A) $(2z + 3)(5z - 2)$
B) $(10z + 3)(z - 2)$
C) $(2z - 3)(5z + 2)$
D) prime

Factor completely.

4) $27a^4 - 48b^2$

A) $3(3a^2 - 4b)^2$
B) $3(3a^2 + 4b)^2$
C) $3(3a^2 + 4b)(3a^2 - 4b)$
D) Prime

Factor the polynomial.

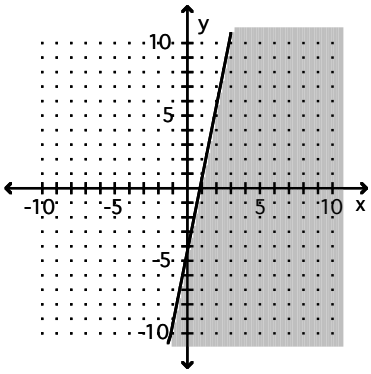
5) $xa + 3a - xt - 3t$

A) $(x - 3)(a + t)$
B) $(x - t)(a + 3)$
C) $(x + a)(3 - t)$
D) $(x + 3)(a - t)$

Graph the linear inequality in two variables.

6) $5x - y \le 4$

A)



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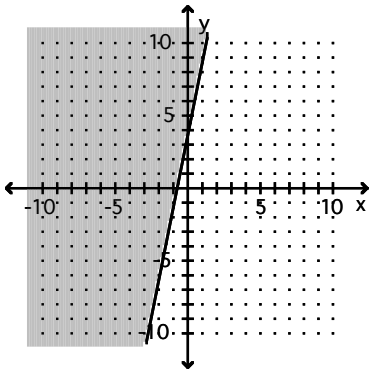
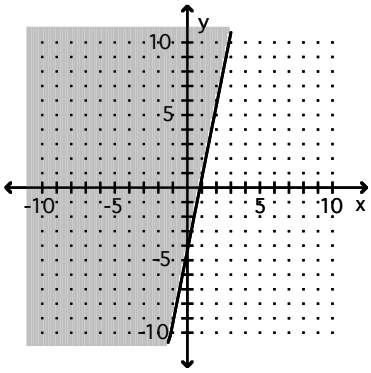


C)



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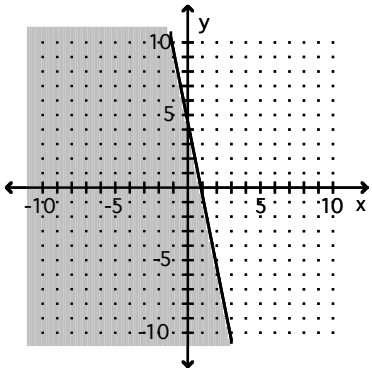


Find the solution set for the equation.

7) $|8x + 7| + 8 = 13$

A) $\left\{-\frac{2}{7}, -\frac{12}{7}\right\}$ B) $\varnothing$ C) $\left\{-\frac{1}{4}, -\frac{3}{2}\right\}$ D) $\left\{\frac{1}{4}, \frac{3}{2}\right\}$

Solve the equation by first clearing the fractions.

8) $\frac{4}{5}y - (y + \frac{2}{3}) = \frac{1}{30}(y + 6)$

A) $\{2\}$ B) $\left\{-\frac{26}{5}\right\}$ C) $\left\{\frac{26}{53}\right\}$ D) $\left\{-\frac{26}{7}\right\}$

Solve the problem.

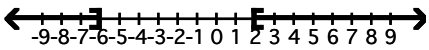
9) One half of a number is 3 more than one–sixth the same number. What is the number?

A) 12 B) 9 C) 8 D) 18

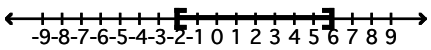
Solve and graph the solution set on a number line.

10) $3 + \left|1 - \frac{x}{2}\right| \geq 5$

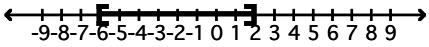
A) $(-\infty, -6] \cup [2, \infty)$



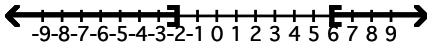
B) $[-2, 6]$



C) $[-6, 2]$



D) $(-\infty, -2] \cup [6, \infty)$



Write the inequality in interval notation.

11) $x \leq -2$

A) $(-\infty, -2]$ B) $(-\infty, -2)$ C) $[-2, \infty)$ D) $(-2, \infty)$

Determine whether the two lines are parallel, perpendicular, or neither parallel nor perpendicular.

12) $3x - 6y = -12$
$18x + 9y = -9$

A) Parallel B) Perpendicular C) Neither

Find the slope of the line.

13) $3x - 4y = 17$

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

Find the axis, domain, and range of the parabola.

14) $f(x) = x^2 + 6x + 6$

A) axis: $x = -6$
domain: $[-3, \infty)$
range: $(-\infty, \infty)$

B) axis: $x = -3$
domain: $(-\infty, \infty)$
range: $[-3, \infty)$

C) axis: $x = -6$
domain: $(-\infty, -3]$
range: $(-\infty, \infty)$

D) axis: $x = -3$
domain: $(-\infty, \infty)$
range: $(-\infty, -3]$

Find the product.

15) $(x - 8)(-4x - 10)$

A) $-4x^2 + 20x + 80$

B) $-4x^2 + 22x + 80$

C) $-4x^2 + 22x + 22$

D) $-4x^2 + 80x + 22$

Perform the division.

16) $\dfrac{40x^8y^8 + 20x^5y^6 + 36x^2y^4}{4x^2y^4}$

A) $10x^6y^8 + 5x^3y^6 + 9y^4$

B) $10x^6y^4 + 5x^3y^2 + 9$

C) $10x^8y^8 + 5x^5y^6 + 9x^2y^4$

D) $-10x^6y^4 + 5x^3y^2 - 9$

17) $\dfrac{x^2 - 5x - 24}{x - 8}$

A) $x + 3$

B) $x^2 + 3$

C) $x - 3$

D) $x + 3 + \dfrac{8}{x - 8}$

Perform the indicated operation.

18) $(-2 + x^2 - 5x) + (-5x + 1 + x^3) + (-5x - 5 - 4x^3)$

A) $-3x^3 + x^2 - 15x - 7$

B) $-3x^3 - 4x^2 - 10x - 6$

C) $-2x^3 - 15x - 6$

D) $-3x^3 + x^2 - 15x - 6$

Solve the equation.

19) $12c^3 + 26c^2 + 10c = 0$

A) $\{0\}$

B) $\left\{-\frac{5}{4}, -\frac{2}{3}\right\}$

C) $\left\{\frac{5}{3}, -\frac{5}{3}\right\}$

D) $\left\{-\frac{5}{3}, -\frac{1}{2}, 0\right\}$

Perform the indicated operation and express in lowest terms.

20) $\frac{(2x - 7)(x + 1)}{(x + 8)(x - 4)} \div \frac{(x + 1)(3x + 7)}{(x + 8)(x - 4)}$

A) $\frac{x - 8}{x + 2}$

B) $\frac{2x - 7}{3x + 7}$

C) $-\frac{2x - 7}{3x + 7}$

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

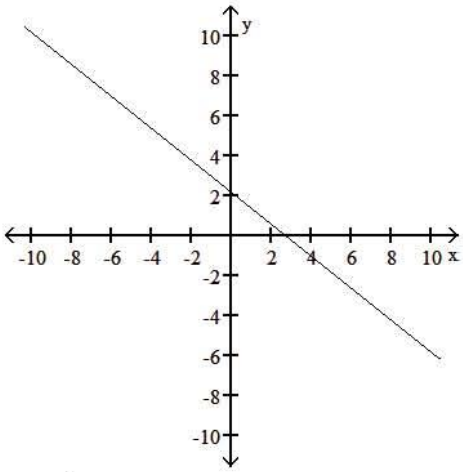
PART B (PRE-CALCULUS / MTT101)
SAMPLE QUESTIONS

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

Graph the linear equation and determine its slope, if it exists.

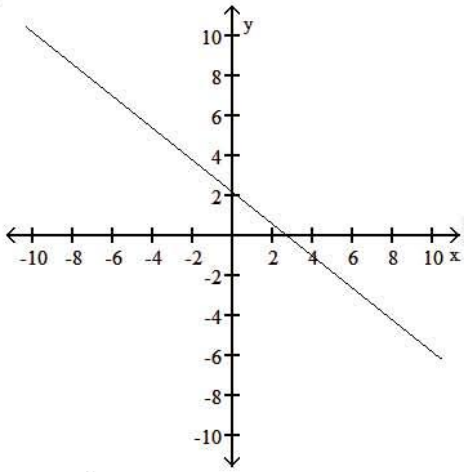
1) $4x + 5y = 11$ 1) _____

A)



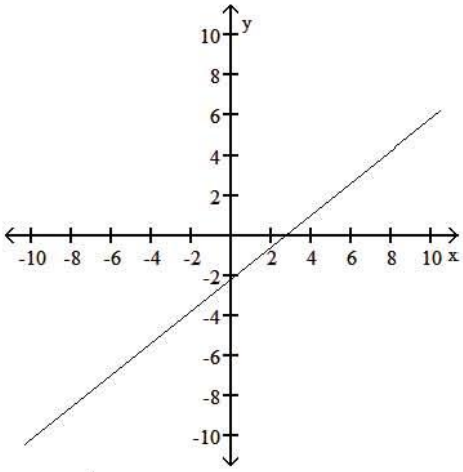
$m = \frac{4}{5}$

B)



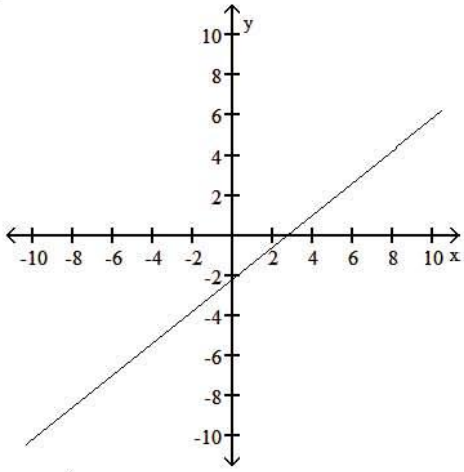
$m = -\frac{4}{5}$

C)



$m = -\frac{4}{5}$

D)



$m = \frac{4}{5}$

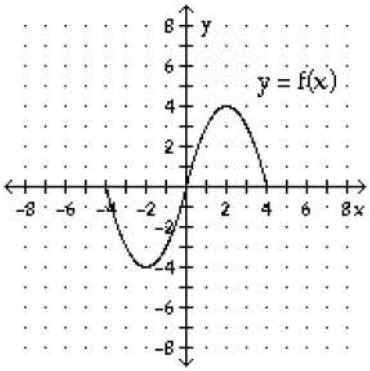
Answer the question.

2) How can the graph of $f(x) = \frac{1}{-x} - 9$ be obtained from the graph of $y = \frac{1}{x}$? 2) _____

A) Reflect it across the y-axis. Shift it 9 units up.
B) Reflect it across the x-axis. Shift it 9 units down.
C) Reflect it across the x-axis. Shift it 9 units up.
D) Reflect it across the y-axis. Shift it 9 units down.

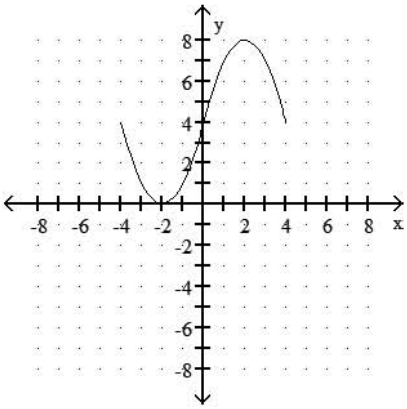
The graph of the function f is shown below. Match the function g with the correct graph.

3) 3) _____

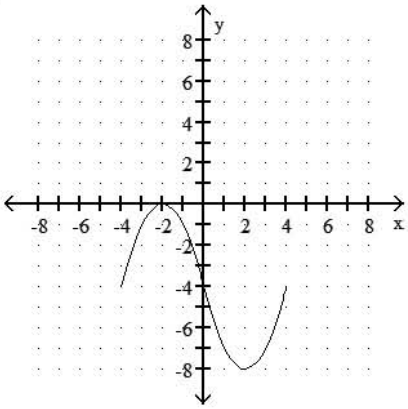


$g(x) = -f(-x) - 4$

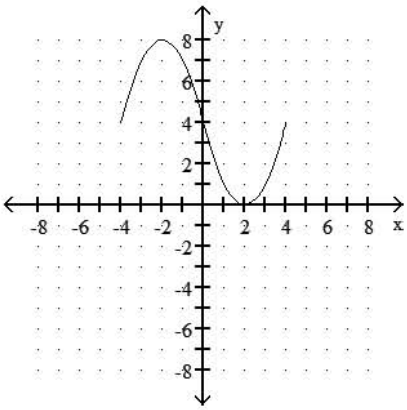
A)



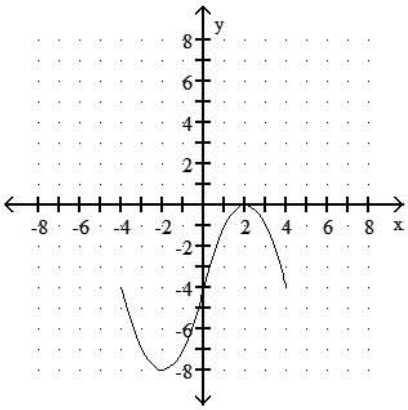
B)



C)

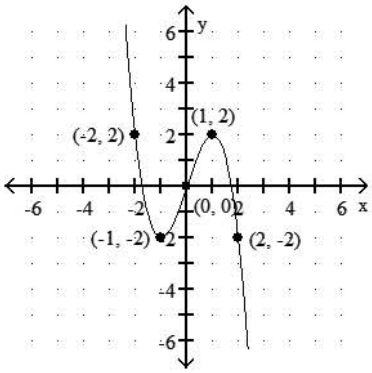


D)

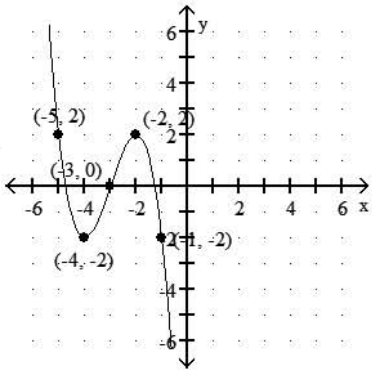


Given the graph of the function $f(x) = -x^3 + 3x$; find a formula for $g(x)$.

4) $f(x) = -x^3 + 3x$ 4) _____



$g(x) =$



A) $g(x) = f(x + 3)$ B) $g(x) = f(x - 3)$ C) $g(x) = f(x) - 3$ D) $g(x) = f(x) + 3$

Solve.

5) $45x + 9x^2 = 0$ 5) _____

A) -22.5 B) -9, -5 C) -5 D) 0, -5

6) $\frac{7x}{x - 7} - \frac{4}{x} = \frac{28}{x^2 - 7x}$ 6) _____

A) $\frac{4}{7}$ B) $\frac{4}{7}, -\frac{4}{7}$ C) $\frac{2}{7}, -\frac{2}{7}$ D) $\frac{7}{4}$

7) $|2x| = -3$ 7) _____

A) -0.67, 0.67 B) ∅ C) 1.5 D) -1.5

A polynomial P(x) and a divisor d(x) are given. Use long division to find the quotient Q(x) and the remainder R(x) when P(x) is divided by d(x), and express P(x) in the form d(x)·Q(x) + R(x).

8) $P(x) = x^4 + 3x^2 + 14$ 8) _____

$d(x) = x^2 - 3$

A) $(x^2 - 3)\cdot(x^2 - x + 6) + 14$ B) $(x^2 - 3)\cdot(x^2 + 6) + 32$

C) $(x^2 - 3)\cdot(x^2 - 3x + 6) + 32$ D) $(x^2 - 3)\cdot(x^2 + 6) + 18$

Factor the polynomial f(x). Then solve the equation f(x) = 0.

9) $f(x) = x^3 - 11x^2 + 36x - 36$ 9) _____

A) $(x + 2)(x - 3)(x + 6)$; -2, 3, -6 B) $(x - 2)(x - 3)(x - 6)$; 2, 3, 6

C) $(x - 2)(x - 3)(x - 7)$; 2, 3, 7 D) $(x - 2)(x + 3)(x - 6)$; -2, 3, -6

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

10) $f(x) = \frac{7x^4 + 6x - 7}{x^2 - 7}$ 10) _____

A) y = 0 B) y = 1 C) y = 7 D) None

State the domain of the rational function.

11) $f(x) = \dfrac{11}{16 - x}$ 11) _____

A) $(-\infty, -16) \cup (-16, 16) \cup (16, \infty)$
B) $(-\infty, 11) \cup (11, \infty)$
C) $(-\infty, -11) \cup (-11, 11) \cup (11, \infty)$
D) $(-\infty, 16) \cup (16, \infty)$

Solve.

12) $\dfrac{x + 12}{x + 8} < 6$ 12) _____

A) $(-\infty, -\dfrac{36}{5}) \cup (8, \infty)$
B) $\varnothing$
C) $\left(-\infty, -8\right) \cup \left(-\dfrac{36}{5}, \infty\right)$
D) $(-8, -\dfrac{36}{5})$

Find the domain and range of the inverse of the given function.

13) $f(x) = 2 - x^2$; $x \geq 0$ 13) _____

A) Domain: $[2, \infty)$; range: $[0, \infty)$
B) Domain: $(-\infty, 2]$; range: all real numbers
C) Domain: $[0, \infty)$; range: $(-\infty, 2]$
D) Domain: $(-\infty, 2]$; range: $[0, \infty)$

Find the domain and the vertical asymptote of the function.

14) $f(x) = \ln (10 - x)$ 14) _____

A) Domain: $(-\infty, -10)$; vertical asymptote: $x = -10$
B) Domain: $(-10, \infty)$; vertical asymptote: $x = -10$
C) Domain: $(-\infty, 10)$; vertical asymptote: $x = 10$
D) Domain: $(10, \infty)$; vertical asymptote: $x = 10$

Find the exact acute angle θ for the given function value.

15) $\csc \theta = 2$ 15) _____

A) 45°
B) 60°
C) 30°

Give the coordinates of the point described

16) The reflection of the point $\left(\dfrac{2}{5}, \dfrac{1}{5}\right)$ across the origin 16) _____

A) $\left(-\dfrac{2}{5}, -\dfrac{1}{5}\right)$
B) $\left(\dfrac{2}{5}, -\dfrac{1}{5}\right)$
C) $\left(-\dfrac{2}{5}, \dfrac{1}{5}\right)$
D) $\left(\dfrac{2}{5}, \dfrac{1}{5}\right)$

Multiply and simplify.

17) $\sec x (\cot x + \sin x)$ 17) _____

A) $\sin x + \csc x$
B) $\cos^2 x + 2 \sin^2 x$
C) $\cos^2 x - \cot x$
D) $\csc x + \tan x$

Solve the system of equations

18) $x + 5y + 4z = -9$ 18) _____
$5y + 4z = -11$
$z = -4$

A) $(-4, 1, 2)$
B) $(2, -4, 1)$
C) No solution
D) $(2, 1, -4)$

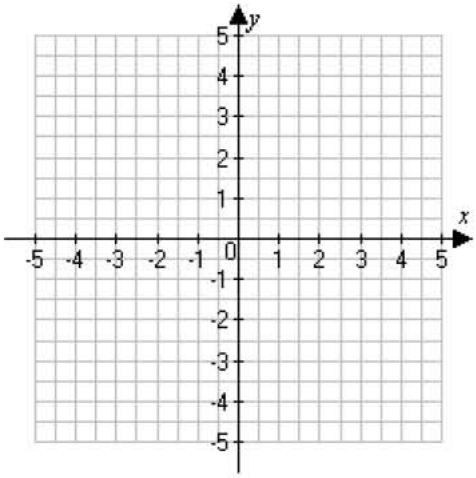
Provide an appropriate response.

19) Fill in the blanks to complete the statement. For a system of 4 equations and 4 unknowns, the corresponding augmented matrix will have _?_ rows and _?_ columns. 19) _____

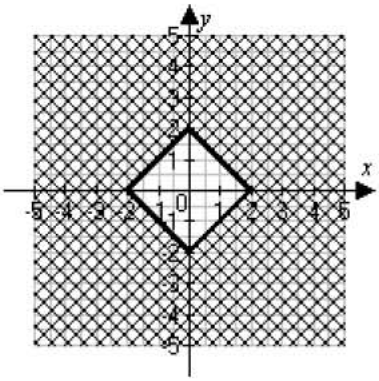
A) 4; 5 B) 5; 5 C) 4; 4 D) 5; 4

Graph the inequality.

20) $|x + y| \geq 2$ 20) _____



A)



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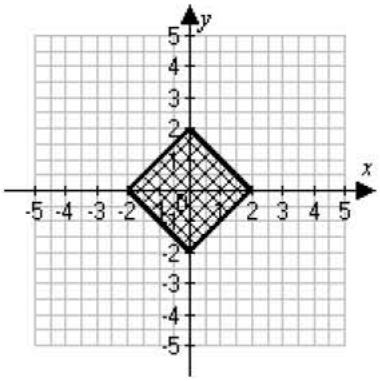

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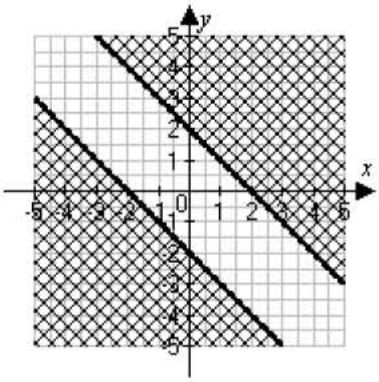

D)