Precalculus Name: _____

C.7 Review

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the system algebraically.

1) $y = x^3 + x^2$
$y = 4x^2$

$x^3 + x^2 = 4x^2$
$-4x^2 \quad -4x^2$
$x^3 - 3x^2 = 0$
$x^2(x-3) = 0$
$x^2 = 0$ → $x = 0$, $y = 0$
$x - 3 = 0$ → $x = 3$, $y = 36$

1) _____

2) $y = 5x^2$
$24x + y = 5$

$24x + 5x^2 = 5$
$5x^2 + 24x - 5 = 0$
$(5x - 1)(x + 5) = 0$
$5x - 1 = 0$ → $x = \frac{1}{5}$, $y = \frac{1}{5}$
$x + 5 = 0$ → $x = -5$, $y = 125$

2) _____

Solve the problem.

3) A theatre sells two types of tickets to their plays; children's tickets and adult tickets. For today's performance they have sold a total of 945 tickets. Also, they have sold 4 times as many children's tickets as adult tickets. How many children ~~tickets have they sold?~~

3) _____

$\begin{cases} A + C = 945 \\ 4A = C \end{cases}$

$A + 4A = 945$

$A = 189$
$C = 756$

Solve.

4) Find the dimensions of a rectangular enclosure with perimeter 40 yd and area 91 yd^2.

$\begin{cases} 2x + 2y = 40 \\ xy = 91 \end{cases}$

on calc

on calc

8yd x 17yds

4) _____

Find the matrix product, if possible.

5) $\begin{bmatrix} -1 & 3 \\ 3 & 2 \end{bmatrix}\begin{bmatrix} 0 & -2 & 4 \\ 1 & -3 & 2 \end{bmatrix}$

$\begin{matrix} 0+3 & 2+9 & -4+6 \\ 0+2 & -6-6 & 12+4 \end{matrix}$

$\begin{bmatrix} 3 & -7 & 2 \\ 2 & -12 & 16 \end{bmatrix}$

5) _____

6) $\begin{bmatrix} -1 & 3 \\ 1 & 6 \end{bmatrix}\begin{bmatrix} 0 & -2 & 5 \\ 1 & -3 & 2 \end{bmatrix}$

$\begin{matrix} 0+3 & 2+9 & -5+6 \\ 0+6 & -2-18 & 5+12 \end{matrix}$

$\begin{bmatrix} 0 & -7 & 1 \\ 6 & -20 & 17 \end{bmatrix}$

6) _____

Determine whether the matrices are inverses.

7) $\begin{bmatrix} -2 & 4 \\ 4 & -4 \end{bmatrix}, \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$

on calc. A B

$A \cdot B = \begin{bmatrix} 1 & .5 \\ 0 & 0 \end{bmatrix}$

they aren't inverses

7) ~~$AB = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$~~

Find a row echelon form or a reduced row echelon form, as indicated, for the given matrix.

8) Find a row echelon form for the matrix.

$\begin{bmatrix} 1 & -4 & 5 & -8 \\ -1 & 6 & 7 & 7 \\ -2 & 12 & 16 & -6 \end{bmatrix} \xrightarrow{R_1+R_2} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & 1 \\ -2 & 12 & 16 & -6 \end{bmatrix} \xrightarrow{2R_1+R_3} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & -1 \\ 0 & 4 & 26 & -22 \end{bmatrix}$

8)

$\xrightarrow{-2R_2+R_3} \begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 2 & 12 & -1 \\ 0 & 0 & 2 & -20 \end{bmatrix} \begin{matrix} \\ \\ \div 2 \\ \div 2 \end{matrix}$

$\begin{bmatrix} 1 & -4 & 5 & -8 \\ 0 & 1 & 6 & -\frac{1}{2} \\ 0 & 0 & 1 & -10 \end{bmatrix}$

Use Gaussian elimination to solve the system of equations.

9) $x - y + 4z = -15$
$5x + z = -4$
$x + 5y + z = -9$

9) _____

$R_1 \cdot 5 + R_3$

$5x - 5y + 20z = -75$
$5x + 5y + z = -9$
$10x + 21z = -84$

$-2R_2 + R_3$

$-10x - 2z = 8$
$+10x + 21z = -84$
$\frac{19z}{19} = \frac{-76}{19}$

$z = -4$

$5x + -4 = -4$
$5x = 0$
$x = 0$

$0 - y + 4(-4) = -15$
$-y = 11$
$y = -11$

$(0, -11, -4)$

Solve the system of equations by finding the reduced row echelon form for the augmented matrix.

10) $x + y + z = 7$
$x - y + 4z = 24$
$5x + y + z = 19$

10) _____

on calc.

$\begin{bmatrix} 1 & 1 & 1 & 7 \\ 1 & -1 & 4 & 24 \\ 5 & 1 & 1 & 19 \end{bmatrix}$

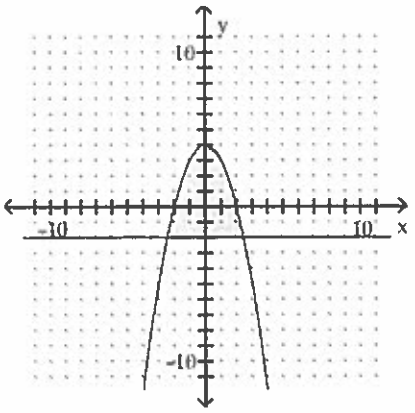
$\text{rref} = \begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 5 \end{bmatrix}$

$(3, -1, 5)$

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

Write a system of inequalities whose solution set is the region shown.

14) 14)



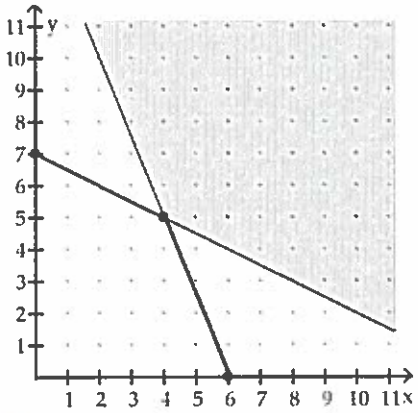
A) $y \le -2$
$y \ge -x^2 + 4$

B) $y \le 2$
$y \ge x^2 + 4$

C) $y \ge -2$
$y \le -x^2 + 4$

D) $x \ge -2$
$y \le -x^2 + 4$

15) 15)



A) $x \ge 0, y \ge 0, y \ge -\frac{1}{2}x + 7, y \ge -\frac{5}{2}x + 6$

B) $x \ge 0, y \ge 0, y \ge -\frac{1}{2}x + 7, y \ge -\frac{5}{2}x + 15$

C) $x \ge 0, y \ge 0, y \le -\frac{1}{2}x + 7, y \le -\frac{5}{2}x + 6$

D) $x \ge 0, y \ge 0, y \ge \frac{1}{2}x + 7, y \ge \frac{5}{2}x + 15$

Solve the system of equations by using an inverse matrix.

11) $-5x + 3y = 8$
$2x - 4y = -20$

on calc.

$\begin{bmatrix} -5 & 3 \\ 2 & -4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ -20 \end{bmatrix}$

$A \cdot X = B$

$X = A^{-1} \cdot B = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$

11) (2, 6)

Answer the question.

12) Find a, b, and c so that the graph of the equation $y = ax^2 + bx + c$ passes through the points (5, 97), (3, 41), and (2, 22). 12) _____

on calc

$\begin{cases} 25a + 5b + c = 97 \\ 9a + 3b + c = 41 \\ 4a + 2b + c = 22 \end{cases}$

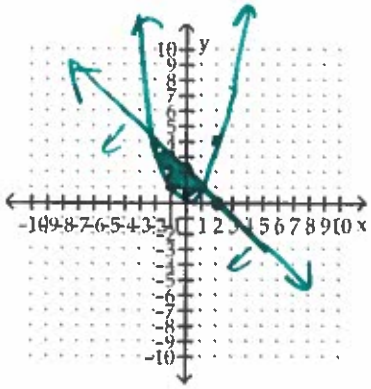
$a(5)^2 + b(5) + c = 97$
$a(3)^2 + b(3) + c = 41$
$a(2)^2 + b(2) + c = 22$

Graph the system of inequalities. Shade the region that represents the solution set.

13) $y \geq x^2$
$x + y \leq 2$

(0,1)
$1 \geq 0$ true
$0 \leq 2$ true

13)



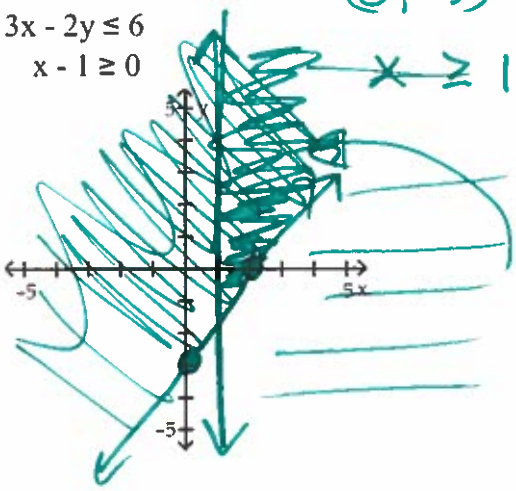
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the system of inequalities.

(0, -3) (2, 0) | test (0,0) $0 \le 6$ true

16) $3x - 2y \le 6$
$x - 1 \ge 0$

16)



$x \ge 1$

solution

Solve the problem.

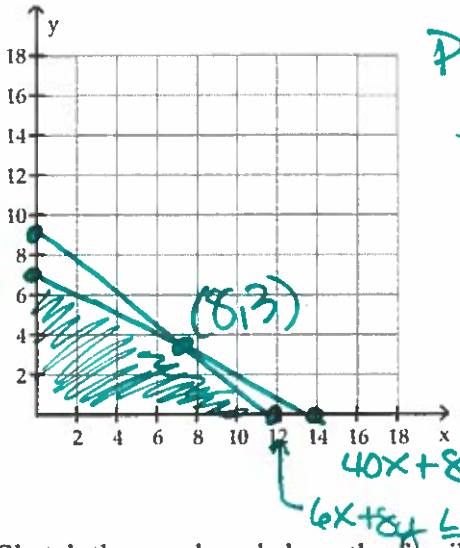
17) Find the maximum value of $P = 8x + 12y$ subject to the following constraints. 17)

$40x + 80y \le 560$
$6x + 8y \le 72$
$x \ge 0$
$y \ge 0$

(0,7) (14,0)
(0,9) (12,0)

on calc

	(0,7)	(8,3)	(12,0)
P:	84	100	96



$40x + 80y \le 560$

$6x + 8y \le 72$

Sketch the graph and show the feasible set

The maximum occurs at (8,3) and is 100

Find the partial fraction decomposition.

18) $\frac{x+2}{x^2-1} = \frac{A}{x+1} + \frac{B}{x-1}$ $(x-1)$ $(x+1)$ $(x+1)$

$\Rightarrow \frac{Ax - A + Bx + B}{x^2-1}$

$\Rightarrow \frac{(A+B)x - A + B}{x^2-1}$

$\Rightarrow \begin{array}{l} A+B=1 \\ -A+B=2 \end{array}$

$2B = 3$

$B = \frac{3}{2}$

$A = -\frac{1}{2}$

18) _____

$\frac{\frac{3}{2}}{x+1} + \frac{-\frac{1}{2}}{x-1}$

or

$\frac{3}{2(x+1)} + \frac{-1}{2(x-1)}$

on calc

19) $\frac{3}{x^2+4x+3} = \frac{A}{x+3} + \frac{B}{x+1}$ $(x+1)$ $(x+3)$ $(x+3)$

19) _____

on calc.

$\frac{Ax + A + Bx + 3B}{x^2+4x+3}$

$\frac{(A+B)x + A + 3B}{x^2+4x+3}$

$A + B = 0$

$A + 3B = 3$

$\frac{2B}{2} = \frac{3}{2}$

$B = \frac{3}{2}$

$A = -\frac{3}{2}$

$\frac{-\frac{3}{2}}{x+3} + \frac{\frac{3}{2}}{x+1}$

or

$\frac{-3}{2(x+3)} + \frac{3}{2(x+1)}$