Algebra 2
Chapter 3 Practice Test

Name KEY
Date

Please solve the system of equations, using *substitution*.

1) $\begin{cases} -5x + y = -2 \\ -3x + 6y = -12 \end{cases}$

1) (0, −2)

$-5x + y = -2$
$+5x \quad +5x$
$y = 5x - 2$
$y = 5(0) - 2$
$y = -2$

$-3x + 6y = -12$
$-3x + 6(5x - 2) = -12$
$-3x + 30x - 12 = -12$
$+12 \quad +12$
$27x = 0$
$x = 0$

Please solve the system of equations, using *elimination*.

2) $\begin{cases} -2x + 6y = 6 \\ -7x + 8y = -5 \end{cases}$

2) (3, 2)

$-7(-2x + 6y = 6)$
$2(-7x + 8y = -5)$
$14x - 42y = -42$
$-14x + 16y = -10$
$-26y = -52$
$y = 2$

$-2x + 6(2) = 6$
$-2x + 12 = 6$
$-12 \quad -12$
$-2x = -6$
$x = 3$

Please solve the system of equations, using any method.

3) $\begin{cases} 2x+8y=6 \\ -5x-20y=-15 \end{cases}$ ÷2, ÷5

$x+4y=3$

$-x-4y=-3$

$0=0$

3) Infinite Solutions

same line twice, infinite solutions

4) $\begin{cases} -2x-y=-9 \\ 5x-2y=18 \end{cases}$ $-2(\ )$

$4x+2y=18$

$5x-2y=18$

$9x=36$

$x=4$

$5x-2y=18$

$5(4)-2y=18$

$20-2y=18$

$-20 \quad -20$

$-2y=-2$

$y=1$

4) (4, 1)

5) $\begin{cases} -14=-20y-7x \\ 10y+4=2x \end{cases}$

$\frac{10y+4}{2}=\frac{2x}{2}$

$5y+2=x$

$5(0)+2=x$

$2=x$

$-14=-20y-7x$

$-14=-20y-7(5y+2)$

$-14=-20y-35y-14$

$+14 \quad +14$

$0=-55y$

$y=0$

5) (2, 0)

6) $\begin{cases} -x-5y+z=17 \\ -5x-5y+5z=5 \\ 2x+5y-3z=-10 \end{cases}$

6) $(-1, -4, -4)$

2) $-5x-5y+5z=5$

3) $2x+5y-3z=-10$

$-3x+2z=-5$

1) $-x-5y+z=17$

3) $2x+5y-3z=-10$

$x-2z=7$

$-3x+2z=-5$

$x-2z=7$

$-2x=2$

$x=-1$

$-3(-1)+2z=-5$

$3+2z=-5$

$-3 \quad -3$

$2z=-8$

$z=-4$

$2x+5y-3z=-10$

$2(-1)+5y-3(-4)=-10$

$-2+5y+12=-10$

$5y+10=-10$

$-10 \quad -10$

$5y=-20$

$y=-4$

Please solve each system of inequalities by graphing.

7) $\begin{cases} x+y>2 \\ 2x-y\geq 1 \end{cases}$

$x+y>2$

$-x \quad -x$

$y>-x+2$

Shade up dotted line (purple)

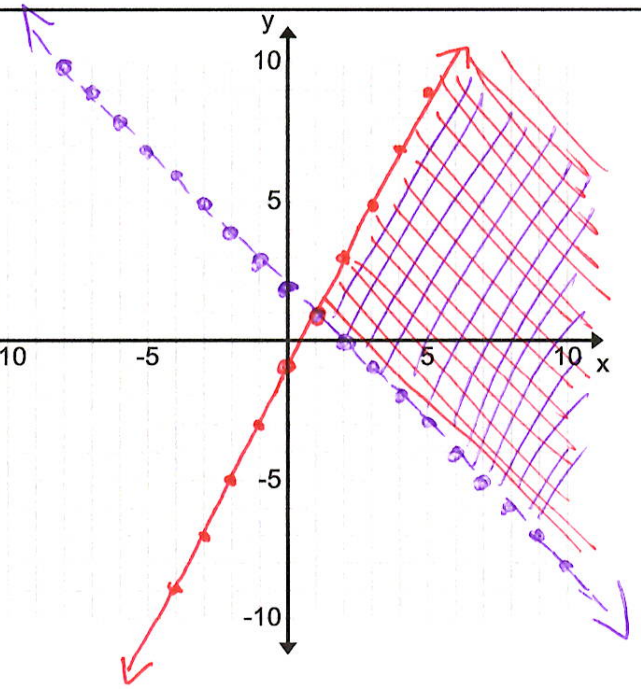
$2x-y\geq 1$

$-2x \quad -2x$

$-y\geq -2x+1$

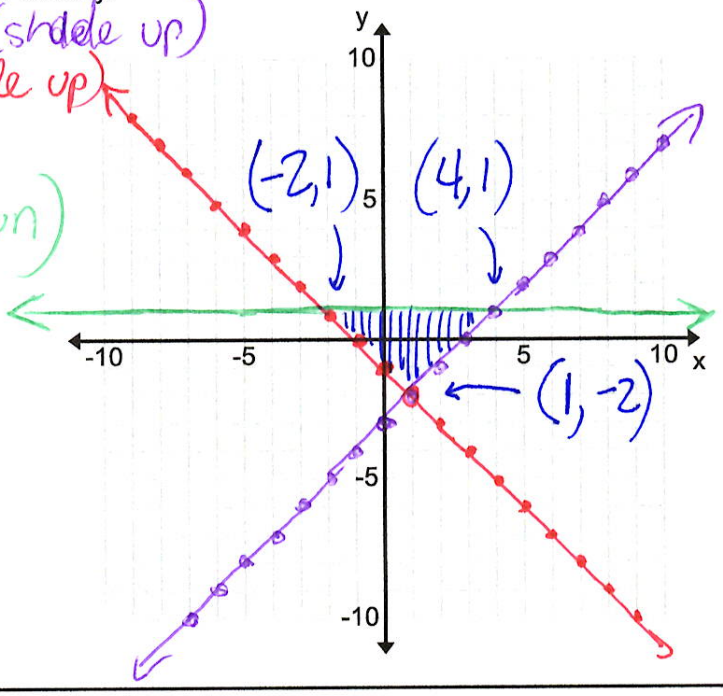
$y\leq 2x-1$

Shade down solid line (red)



Please label all intersection points clearly.

8) $\begin{cases} y \geq x-3 \\ y \geq -x-1 \\ y \leq 1 \end{cases}$ purple (shade up) red (shade up) green (shade down)



Using the intersection points for the problem above, please evaluate the *minimum* and *maximum* values for a cost function defined by **C = –x + 4y**.

9)

point	C = −x+4y	
−2, 1	−(−2)+4(1) = 6	← max
4, 1	−(4)+4(1) = 0	
1, −2	−(1)+4(−2) = −9	↑ min

9) minimum: (1, −2) creates min −9

maximum: (−2, 1) creates max 6

Please perform the following matrix operations, by hand.

10) $\begin{pmatrix} 1 & 3 \\ -7 & 2 \end{pmatrix} + 2\begin{pmatrix} 0 & -2 \\ -4 & 5 \end{pmatrix} = \begin{bmatrix} 1 & 3 \\ -7 & 2 \end{bmatrix} + \begin{bmatrix} 0 & -4 \\ -8 & 10 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ -15 & 12 \end{bmatrix}$

11) $\begin{pmatrix} 1 & 3 \\ -7 & 2 \end{pmatrix}\begin{pmatrix} 0 & -2 \\ -4 & 5 \end{pmatrix} = \begin{bmatrix} 0+-12 & -2+15 \\ 0+-8 & 14+10 \end{bmatrix} = \begin{bmatrix} -12 & 13 \\ -8 & 24 \end{bmatrix}$

12) Please evaluate the determinant, by hand.

$\begin{pmatrix} 1 & 2 \\ 4 & 6 \end{pmatrix}$ $6 - 8 = -2$

13) Please evaluate the inverse, by hand.

$\begin{pmatrix} 1 & 2 \\ 4 & 6 \end{pmatrix}$ $\frac{1}{-2}\begin{bmatrix} 6 & -2 \\ -4 & 1 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ 2 & -\frac{1}{2} \end{bmatrix}$

14) Please solve the same system of equations from #3, using Cramer's Rule. $(2, -5)$

(You may use technology, as long as you clearly state what steps you took, and write out each calculator result.)

$\begin{cases} -7x + y = -19 \\ -2x + 3y = -19 \end{cases} \Rightarrow \begin{bmatrix} -7 & 1 \\ -2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -19 \\ -19 \end{bmatrix}$

D of orig matrix $= \begin{bmatrix} -7 & 1 \\ -2 & 3 \end{bmatrix} = -19$

$D_x, \begin{vmatrix} -19 & 1 \\ -19 & 3 \end{vmatrix} = -38$ $D_y, \begin{vmatrix} -7 & -19 \\ -2 & -19 \end{vmatrix} = 95$

$x = \frac{D_x}{D} = \frac{-38}{-19}$

$x = 2$

$y = \frac{D_y}{D} = \frac{95}{-19}$

$= -5$

15) Please solve the same system of equations from #6, using an *inverse matrix*.

(You may use technology, as long as you clearly state what steps you took, and write out each calculator result.)

$\begin{cases} -x - 5y + z = 17 \\ -5x - 5y + 5z = 5 \\ 2x + 5y - 3z = -10 \end{cases} \Rightarrow$

$A = \begin{bmatrix} -1 & -5 & 1 \\ -5 & -5 & 5 \\ 2 & 5 & -3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 17 \\ 5 \\ -10 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} -\frac{1}{2} & -\frac{1}{2} & -1 \\ -\frac{1}{4} & \frac{1}{20} & 0 \\ -\frac{3}{4} & -\frac{1}{4} & -1 \end{bmatrix} \rightarrow$

$\begin{bmatrix} -\frac{1}{2} & -\frac{1}{2} & -1 \\ -\frac{1}{4} & \frac{1}{20} & 0 \\ -\frac{3}{4} & -\frac{1}{4} & -1 \end{bmatrix}\begin{bmatrix} -1 & -5 & 1 \\ -5 & -5 & 5 \\ 2 & 5 & -3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & -\frac{1}{2} & -1 \\ -\frac{1}{4} & \frac{1}{20} & 0 \\ -\frac{3}{4} & -\frac{1}{4} & -1 \end{bmatrix}\begin{bmatrix} 17 \\ 5 \\ -10 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ -4 \\ -4 \end{bmatrix}$

$(-1, -4, -4)$