Master Problem Set R2

1. Solve the following systems algebraically

a)

$y = 5x^2 - 5x + 3$

$y = 2x + 9$

$2x+9 = 5x^2-5x+3$

$-2x \quad\quad -2x$

$9 = 5x^2-7x+3$

$-9 \quad\quad -9$

$0 = 5x^2-7x-6$

$-10 \times +3 = -7$, -36

$0 = (5x^2-10x)+(3x-6)$

$0 = 5x(x-2)+3(x-2)$

$0 = (5x+3)(x-2)$

$5x+3=0 \quad x-2=0$

$-3\ -3 \quad +2\ +2$

$\frac{5x}{5} = \frac{-3}{5} \quad x=2$

$\left(-\frac{3}{5}, \frac{39}{5}\right)$

$(2, 13)$

b)

$y = -x^2 - 3x + 41$

$y = -3x - 8$

$-3x-8 = -x^2-3x+41$

$+3x \quad\quad +3x$

$-8 = -x^2+41$

$-41 \quad\quad -41$

$\frac{-49}{-1} = \frac{-x^2}{-1}$

$49 = x^2$

$x = \pm 7$

$(-7, 13)$

$(7, -29)$

c)

$(x+2)^2 + y^2 = 40$

$x - y = 2$

Solve for x: $+y \quad +y$

$x = y+2$

$(x+2)^2 + y^2 = 40$

$(y+2+2)^2 + y^2 = 40$

$(y+4)^2 + y^2 = 40$

$y^2+8y+16+y^2 = 40$

$\frac{2y^2}{2} + \frac{8y}{2} - \frac{24}{2} = 0$

$y^2+4y-12=0$

$4 \times -2 = 6$, -12

$(y+6)(y-2)=0$

$y=-6$

$y=2$

$(-4, -6)$

$(4, 2)$

d)

$x^2 + (y-1)^2 = 97$

$-x + y = 6$

$+x \quad\quad +y$

$y = x+6$

$x^2+(y-1)^2 = 97$

$x^2+(x+6-1)^2 = 97$

$x^2+(x+5)^2 = 97$

$x^2+x^2+10x+25 = 97$

$\frac{2x^2}{2} + \frac{10x}{2} - \frac{72}{2} = 0$

$x^2+5x-36=0$

$5 \times -4 = 9$, -36

$(x+9)(x-4)=0$

$x=-9 \quad x=4$

$(-9, -3)$

$(4, 10)$

e)

$(x+5)^2 + y^2 = 13$

$x - 3y = -2$

$x = 3y-2$

$(3y-2+5)^2+y^2=13$

$(3y+3)^2+y^2=13$

$9y^2+18y+9+y^2=13$

$\frac{10y^2}{2} + \frac{18y}{2} - \frac{4}{2} = 0$

$5y^2+9y-2=0$

$9 \times -1 = 10$, -10

$(5y^2+10y)+(-1y-2)=0$

$5y(y+2)-1(y+2)=0$

$(5y-1)(y+2)=0$

$y=\frac{1}{5} \quad y=-2$

$\left(-\frac{7}{5}, \frac{1}{5}\right)$

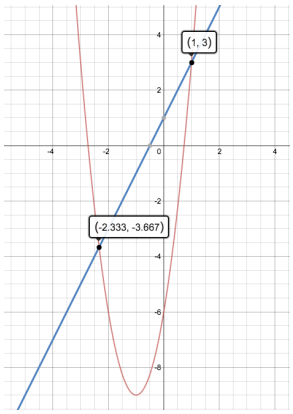
$(-8, -2)$

2. Solve the following systems graphically (round all decimals to nearest tenth):

a)

$y = 3x^2 + 6x - 6$

$y = 2x + 1$



Solutions: (1,3) and (-2.333, -3.667)

b) 2b

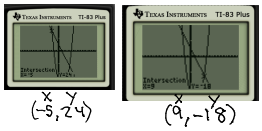
$y = x^2 - 7x - 36$

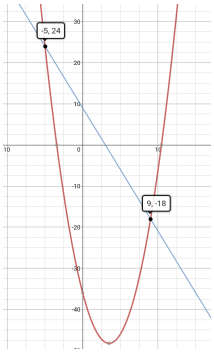
$3x + y = 9$

$-3x \quad -3x$

$y = -3x + 9$

Graphically: Always solve for y



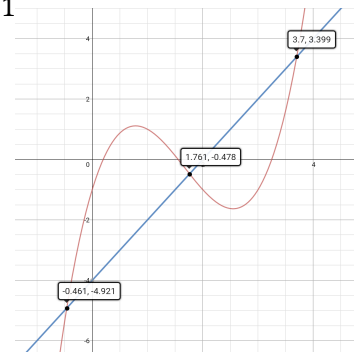


Solutions: (-5, 24) and (9, -18)

c)

$y = x^3 - 5x^2 + 6x - 1$

$y = 2x - 4$

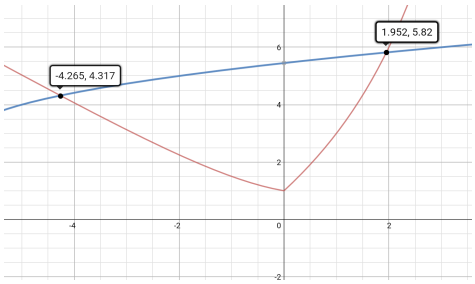


Answers: (3.7, 3.4) (1.8, -0.5) (-0.5, -4.9)

d)

$y = |x| + 2^x$

$y = \sqrt{x + 6} + 3$

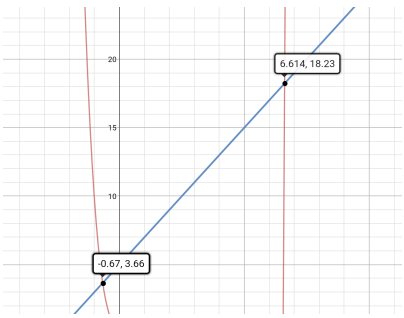


Solutions: (2.0, 5.8) and (-4.3, 4.3)

e)

$y = x^4 - \frac{13}{2}x^3 - \frac{9}{4}x$

$y = 2x + 5$

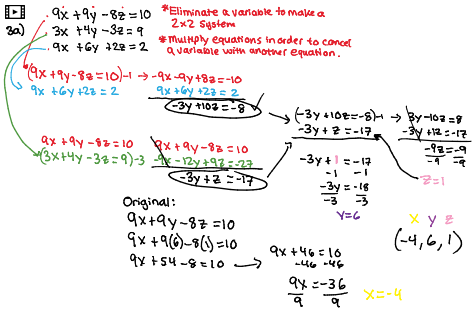


Solutions: (6.6, 18.2) and (-.7, 3.7)

3. Solve the following system algebraically:

a)

$9x + 9y - 8z = 10$
$3x + 4y - 3z = 9$
$9x + 6y + 2z = 2$



(-4, 6, 1)

b)

$-2x - 5y + 3z = 10$
$x + 9y + 5z = -5$
$4x - y - 8z = 7$

(7, -3, 3)

c)

$8x + 2y + 9z = -6$
$4x + 3y + 2z = -4$
$-4x + 3y - 8z = -8$

(8, -8, -6)

d)

$7x + 4y + 9z = -5$
$4x + 5y - 9z = -4$
$4x + 6y - 9z = 6$

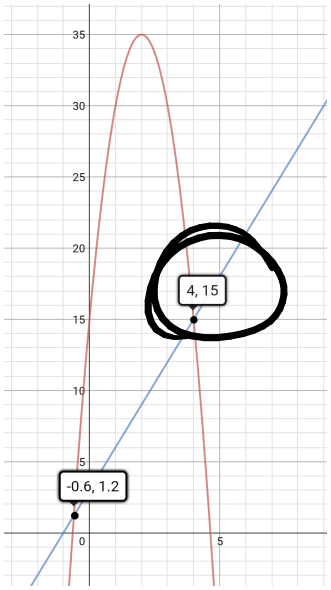
(-9, 10, 2)

e)

A candy store sells three different packages of candy: Packages of lollipops, gum, and chocolate. Sarai comes in and purchases 9 packages of lollipops, 3 packages of gum, and 4 packages of chocolate and her total is $53. Benji purchases 9 packages of lollipops, 6 packages of gum, and 5 packages of chocolate and spends $64. Giselle buys three packages of lollipops, 5 packages of gum, and 2 packages of chocolate and her total is $31. Find the total cost of each package of candy.

Lollipops: $4 per package
Gum: $3 per package
Chocolate: $2 per package

f) Yes, they will meet after 4 seconds at a spot 15 feet above the ground



g) System: v = # of volleyballs sold
b = # of basketballs sold
f = # of footballs sold

$5v = f$

$35f + 25b + 15v = 3750$

$4(15v) = 25b$

$60v = 25b$

① Substitute $5v$ in for f in second equation

$35(5v) + 25b + 15v = 3750$

$175v + 25b + 15v = 3750$

② substitute $60v$ in for $25b$

$175v + (60v) + 15v = 3750$

$\frac{250v}{250} = \frac{3750}{250}$

$v = 15$

$5(15) = f$

$75 = f$

$60(15) = 25b$

$\frac{900}{25} = \frac{25b}{25}$

$36 = b$