SOL HW 8.2

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Name: Solution Date:

Pre Calculus 11: HW Section 8.2 Solving Systems of Equations by Elimination

1. Solve each system by using elimination:

i) $2x+3y=18$ ① ; $2x-3y=-6$ ② ; $4x+0=12$ ① + ② ; $x=3$; $\therefore (3,4)$

Substitute Them: $2x+3y=18$; $2x-3y=-6$; $0 \quad 6y=24$; $y=4$.

ii) $7x-4y=26$ ① ; $3x+4y=-6$ ② ; $10x+0=20$ ① + ② ; $x=2$; $\therefore (2,-3)$

PLUG IT BACK IN: $7(2)-4y=26$; $-4y=12$; $y=-3$; OR $3(2)+4y=-6$; $4y=-12$; $y=-3$

iii) $y=x^2-16x+60$ ① $\quad y=12x-55$ ②

$y=12x-55$ ② ; $0=x^2-28x+115$ ① − ② ; $0=(x-5)(x-23)$; $x=5 \quad x=23$

$y=12(5)-55$; $y=60-55$; $y=5$. $\quad y=12(23)-55$; $y=276-55$; $y=221$

$\therefore (5,5)$ AND $(23,221)$.

iv) $2y^2+20y+x=-40$ $\quad 7y+2x+26=0$

$4y^2+40y+2x=-80$ ① ; $7y+2x+26=0$ ② SUBTRACT. ; $4y^2+33y+0-26=-80$

$4y^2+33y+54=0$. ; 4×27 ; 1×6 ; -9 ; $(4y+9)(y+6)=0$; $y=-9/4 \quad y=-6$; $x=20.1875 \quad x=8$

$7(-6)+2x+26=0$; $-42+2x+26=0$; $2x=16$; $x=8$; $\therefore (8,-6)$; $(20.1875,-9/4)$.

v) $2x-5=3y$ $\quad 2x^2-5x=y$

$2x-5=3y$ ① ; $6x^2-15x=3y$ ② SUBTRACT ; $-6x^2+17x-5=0$; $6x^2-17x+5=0$; 3×2 ; -5×-1 ; $(2x-5)(3x-1)=0$; $x=\frac{5}{2} \quad x=\frac{1}{3}$

$\therefore (\frac{5}{2},0)$; $(\frac{1}{3},-\frac{13}{9})$

$2(\frac{5}{2})-5=3y$; $0=y$; $2(\frac{1}{3})-5=3y$; $\frac{2}{3}-5=3y$; $\frac{-13}{3}=3y$; $-\frac{13}{9}=y$

vi) $x^2+40x-y+400=0$ $\quad x^2=y+30x-225$

$x^2+40x+400=y$; $x^2-30x+225=y$; $70x=-175$; $x=\frac{-175}{70}=\frac{-5}{2}$

$y=(\frac{-5}{2})^2+40(\frac{-5}{2})+400$; $y=\frac{25}{4}-100+400$; $y=306.25$; $\therefore (-\frac{5}{2},306.25)$

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vii) $2x^2+5x-2y=0$ $\quad 0=y+3x+6$

$2x^2+5x-2y=0$; $12+6x+2y=0$ ⑥ ; $0=2y+6x+12$. ; ⑤+⑥ ; $2x^2+11x+12=0$; 2×6 ; 1×12 ; $(2x+3)(x+4)=0$; $x=-\frac{3}{2} \quad x=-4$

$0=y+3(-\frac{3}{2})+6$; $1.5=y$; $0=y+(-12)+6$; $6=y$; $\therefore (-\frac{3}{2},\frac{3}{2}) ; (-4,6)$

viii) $15x^2+8x=y$ $\quad 2+9x+y=0$

$15x^2+8x-y=0$ ⑤ ; $2+9x+y=0$ ⑥ ; $15x^2+17x+2=0$ ⑤+⑥ ; 15×1 ; $(15x+2)(x+1)=0$; $x=-\frac{2}{15} \quad x=-1$

$2+9(-\frac{2}{15})+y=0$; $2-\frac{3}{5}=-y$; $-\frac{7}{5}=y$; $2+9(-1)+y=0$; $-7+y=0$; $y=7$.

$\therefore (-\frac{2}{15},-\frac{7}{5}) ; (-1,-7)$

ix) $x+y=0$ $\quad x^2-y=2$

$y=-x$; $x^2-2=y$; $-x=x^2-2$; $0=x^2+x-2$; $0=(x+2)(x-1)$; $x=-2 \quad x=1$; $y=2 \quad y=-1$; $\therefore (-2,2) ; (1,-1)$

x) $x^2+x+4=y$ $\quad 8x+4=y$

$x^2+x+4=8x+4$. ; $x^2-7x=0$; $x(x-7)=0$; $x=0 \quad x=7$; $y=4 \quad y=56+4$; $y=60$; $\therefore (4,4) ; (7,60)$.

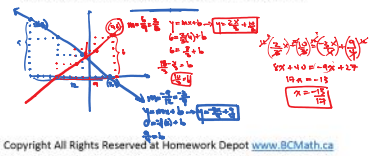
2. The lines with equations $px+3y=15$ and $6x+qy=30$ pass through the point (4,-3). What is the value of p+q?

$4p+3(-3)=15$; $4p-9=15$; $4p=24$; -6 ; $=4$

$6(4)+q(-3)=30$; $24-3q=30$; $-3q=6$; $q=-2$

$-1=$; $\therefore p+q=6+(-2)$

3. Line "A" passes through the points (3,0) and (-9,9) and line "B" passes through the points (-5,0) and (4,6). What is the intersection point between lines "A" and "B"?



$y=\frac{2x}{3}+\frac{10}{3}$; $y=\frac{2}{3}(\frac{-13}{17})+\frac{10}{3}$; $y=\frac{-26}{51}+\frac{170}{51}$; $y=\frac{144}{51}=\frac{48}{17}$; $\therefore (\frac{-13}{17},\frac{48}{17})$

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i) $2x+3y=18$; $-2x-3y=-6$; $6y=24$; $y=4$

$2x+3(4)=18$; $2x=18-12$; $2x=6$; $x=3$

SOLN: $(3,4)$

$x=5,\ y=-3$

4. The following system has (5,-3) as a solution. What are the values of "a" and "b"?

$ax+by=-11 \longrightarrow 5a+-3b=-11$

$2ax-3by=8 \longrightarrow 2(a)(5)-3(b)(-3)=8$

$5a-3b=-11 \longrightarrow^{\times 2} 10a-6b=-22$ ①

$10a+9b=8$ ② SUBTRACT

$15b=30$ ② − ①

$b=2$

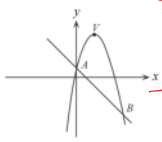
$5a-3(2)=-11$

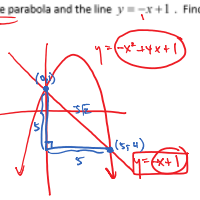
$5a=-11+6$

$5a=-5$

$a=-1$

5. In the diagram, "V" is the vertex of the parabola with equations $y=-x^2+4x+1$. Points "A" and "B" are intersections between the parabola and the line $y=-x+1$. Find the distance from point "A" to "B".





$-x^2+4x+x=-x+1$

$0=x^2-5x$

$0=x(x-5)$

$x=0$ $x=5$

$y=1$ $y=-4$

$\text{Dist} = 5\sqrt{2}$

6. The lines $bx+y=30$ and $x+by=c$ intersect at the point P(6,12), determine the value of "c":

① $x=6,\ y=12$

$6b+12=30$

$6b=18$

$b=3$

$6+b(12)=c$

$6+3(12)=c$

$6+36=c$

$42=c$

7. Determine all ordered pairs (x,y) that satisfy the following system of equations:

$x+y=16 \rightarrow y=16-x$

$\frac{4}{7}=\frac{1}{x}+\frac{1}{y} \rightarrow \frac{4}{7}=\frac{1}{x}+\frac{1}{16-x}$

$4(x)(16-x)=7(16-x)+7(x)$

$64x-4x^2=112-7x+7x$

$0=4x^2-64x+112$

$0=x^2-16x+28$

$0=(x-14)(x-2)$

$x=14,\ x=2$

$x=14$ $y=2$ $\quad x=2$ $y=14$

$\therefore (14,2)\ \&\ (2,14)$

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8. If $(x+1)(x-1)=8$, then what is the value of $(x^2+x)(x^2-x)$

① $x^2-1=8$

$x^2=9$

② $x(x+1)(x)(x-1)=?$

$x^2(x+1)(x-1)=?$

$9(8)=?$

$72=?$

9. The line $y=2x+2$ intersects the parabola $y=x^2-3x+c$ at two points. One of these points is (1,4). Determine the coordinates of the second point of intersection.

① $x=1$ $y=4$

$4=1^2-3(1)+c$

$4=1-3+c$

$4=-2+c$

$6=c$

② $2x+2=x^2-3x+6$

$0=x^2-5x+4$

$0=(x-4)(x-1)$

$x=4$ $x=1$

$y=10$ $y=4$

$\therefore (1,4)\ \&\ (4,10)$

10. Solve the system: $x^2-xy+8=0$

$x^2-8x+y=0$

HINT: $x^2+8=xy$ $\quad \frac{x^2+8}{x}=y$

ANS: $y=-x^2+8x$.

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