Take-Home Test 3

$$f(x)=\frac{(x+1)^2(x-2)}{(x-3)(x+5)(x-2)}=\frac{(x+1)^2(x-2)}{(x-3)(x+5)}$$ Lowest Terms

$D=\mathbb{R}\setminus\{-5,2,3\}$

V.A. $x=-5$, $x=3$

Hole @ $x=2 \rightsquigarrow (2,0)$ = HOLE

H.A. None

S.A.:

$$x^3-19x+30 \;\overline{)\; x^4-2x^3-3x^2+4x+4}\;\; x-2$$

$$-\left(x^4 \quad -19x^2+30x\right)$$

$$-2x^3+16x^2-26x+4$$

$$-2x^3$$

$\frac{x^4}{x^3}=x$

$\frac{-2x^3}{x^3}=-2$

$y=x-2$ is slant asymptote

Critical values

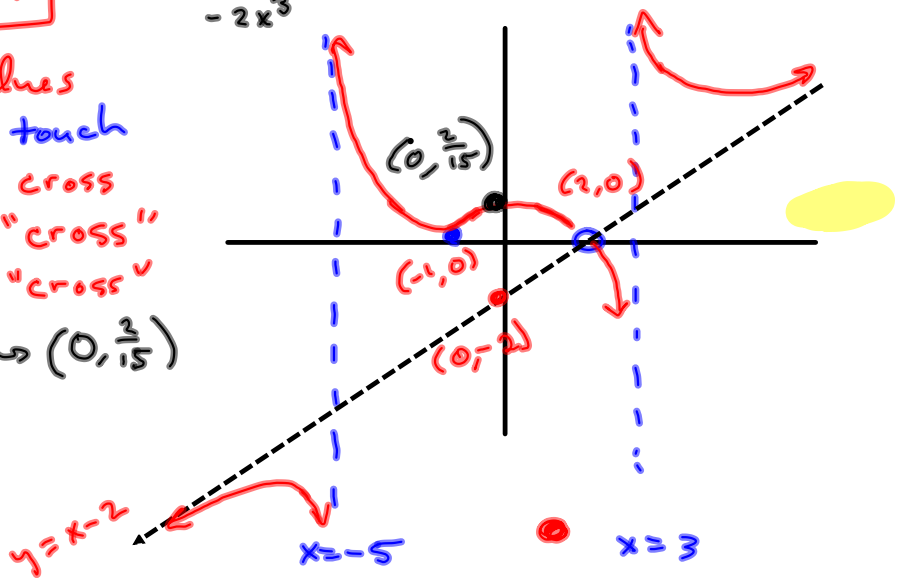
$x=-1$ touch

$x=2$ cross

$x=-5$ "cross"

$x=3$ "cross"

y-int: $\frac{4}{30}=\frac{2}{15} \rightsquigarrow (0,\frac{2}{15})$



Solving Systems of Linear Equations

2 METHODS:

① Substitution

② Elimination

(a) GAUSSIAN (BACK-SUBSTITUTION)

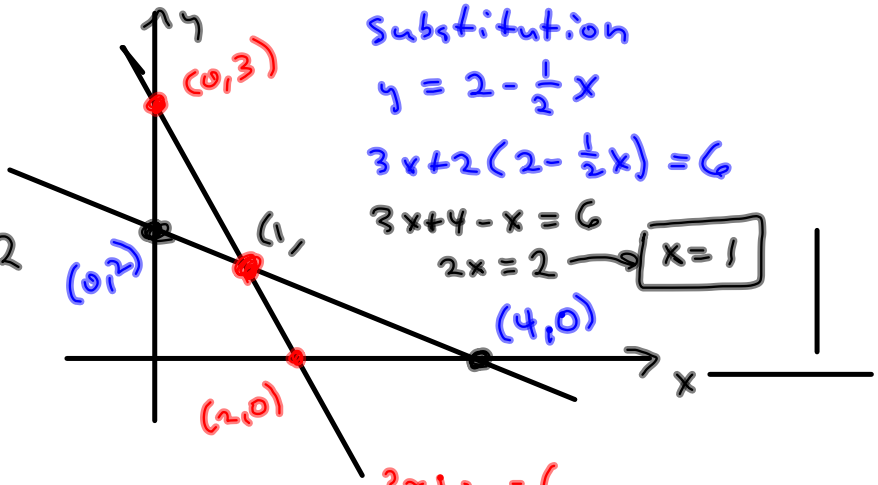
(b) GAUSS-JORDAN (BACK-ELIMINATION)

$3x+2y=6$

$\frac{1}{2}x+y=2$

$3x+2y=6$	
x	y
0	3
2	0

$\frac{1}{2}x+y=2$	
x	y
0	2
4	0



Substitution

$y = 2-\frac{1}{2}x$

$3x+2(2-\frac{1}{2}x)=6$

$3x+4-x=6$

$2x=2 \rightarrow x=1$

$3x+2y=6$

$y=2-\frac{1}{2}x$

$=2-\frac{1}{2}(1)$

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

$\{1, \frac{3}{2}\}$

$(x,y)=(1,\frac{3}{2})$

Solution Set

$(x,y) \in \{(1,\frac{3}{2})\}$

" $\in$ " is an element (member) of "

	M	F	Republicrat / Demublican
DEM	40	20	190
REP	30	40	180
other	30	40	

Totals 190 students preferred Dem.
180 .. .. Rep.

How many students at the school?

1st Thing Let x = the # of male students
y = ... female ..

$.4x + .2y = 190$

$.3x + .4y = 180$

$4x + 2y = 1900 \xrightarrow{\div 2} 2x + y = 950 \Rightarrow y = 950 - 2x$

$3x + 4y = 1800 \Rightarrow 3x + 4(950 - 2x) = 1800$

$3x + 3800 - 8x = 1800$

$-5x + 3800 = 1800$

$-5x = -2000$

$x = 400$

$y = 950 - 2x = 950 - 2(400)$

$= 950 - 800$

$= 150 = y$

African Native
Hispanic
Pacific Islander
1st gen.

↳ Majoring in STEM Fellowship Opportunity

1 Elimination

1st System

E1 $x + 2y = 3$

E2 $2x - 4y = 6$

Eliminate $2x$ in E2.

Adding equations doesn't change the solution, nor does multiplying an equation by something non zero

Scratch: $-2E1$: $-2x - 4y = -6$

E2: $2x - 4y = 6$

$-2E1 + E2$: $0 - 8y = 0$

$-8y = 0$

$y = \frac{0}{-8} = 0 = y$

E1: $x + 2y = x + 2(0) = 3$

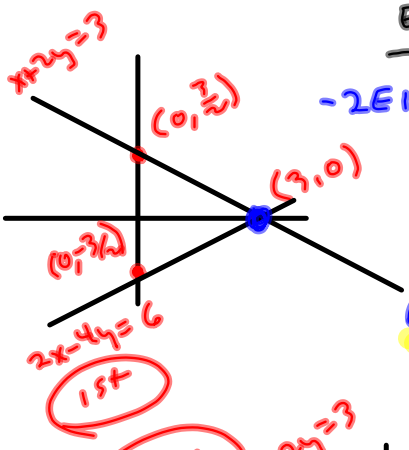
Back-substitution

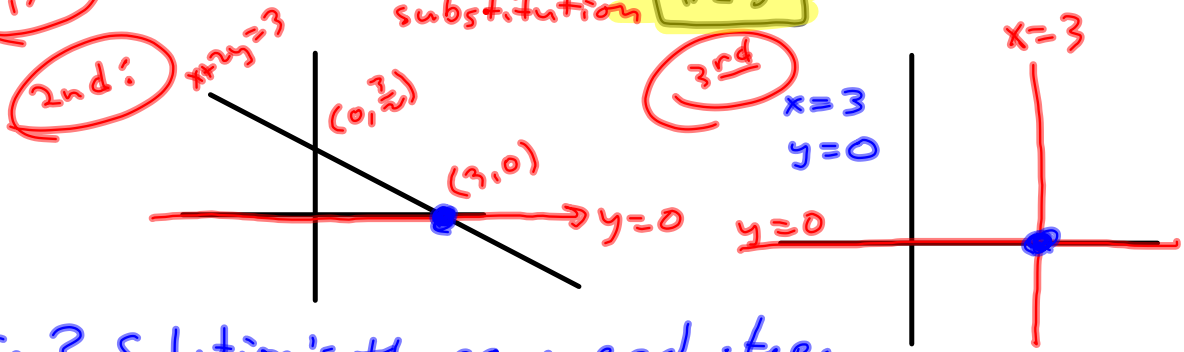
$x = 3$

2nd System

$x + 2y = 3$

$y = 0$





See? Solution's the same, each step.

It just gets closer to reading the solution from the system.

Matrix Methods

$x + 2y = 3$
$2x - 4y = 6$

(Augmented) Coefficient Matrix

$$\begin{matrix} E1 \\ E2 \end{matrix}\begin{bmatrix} 1 & 2 & | & 3 \\ 2 & -4 & | & 6 \end{bmatrix} \quad R+S$$

$$\begin{matrix} E1 \\ -2E1+E2 \end{matrix}\begin{bmatrix} 1 & 2 & | & 3 \\ 0 & -8 & | & 0 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & | & 3 \\ 0 & 1 & | & 0 \end{bmatrix}$$

This is Front-Elimination

$$\begin{matrix} -2E2+E1 \\ E2 \end{matrix}\begin{bmatrix} 1 & 0 & | & 3 \\ 0 & 1 & | & 0 \end{bmatrix} \Rightarrow \boxed{\begin{matrix} x=3 \\ y=0 \end{matrix}}$$

This was Back-Elimination!

Gauss-Jordan