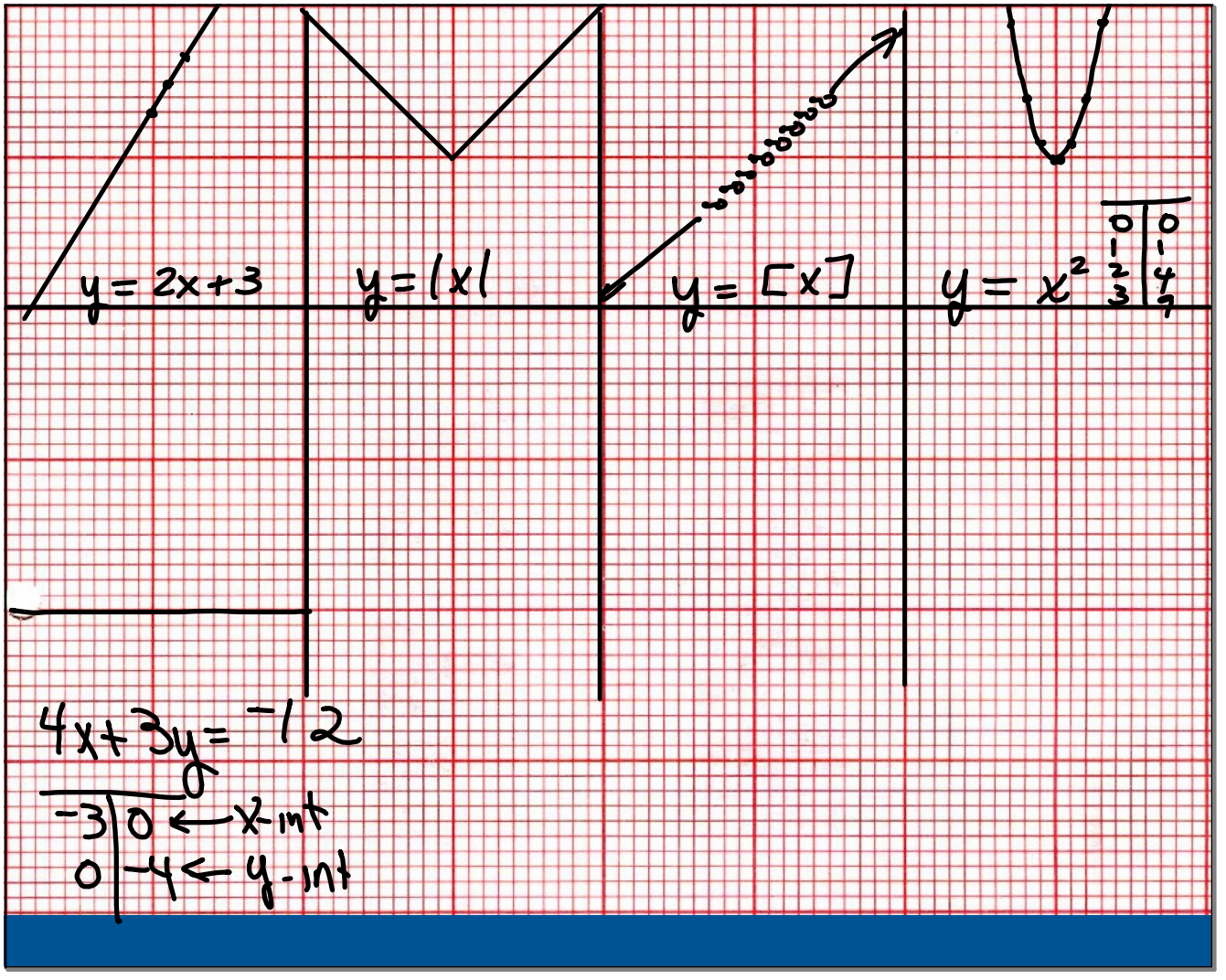
December 6, 2023



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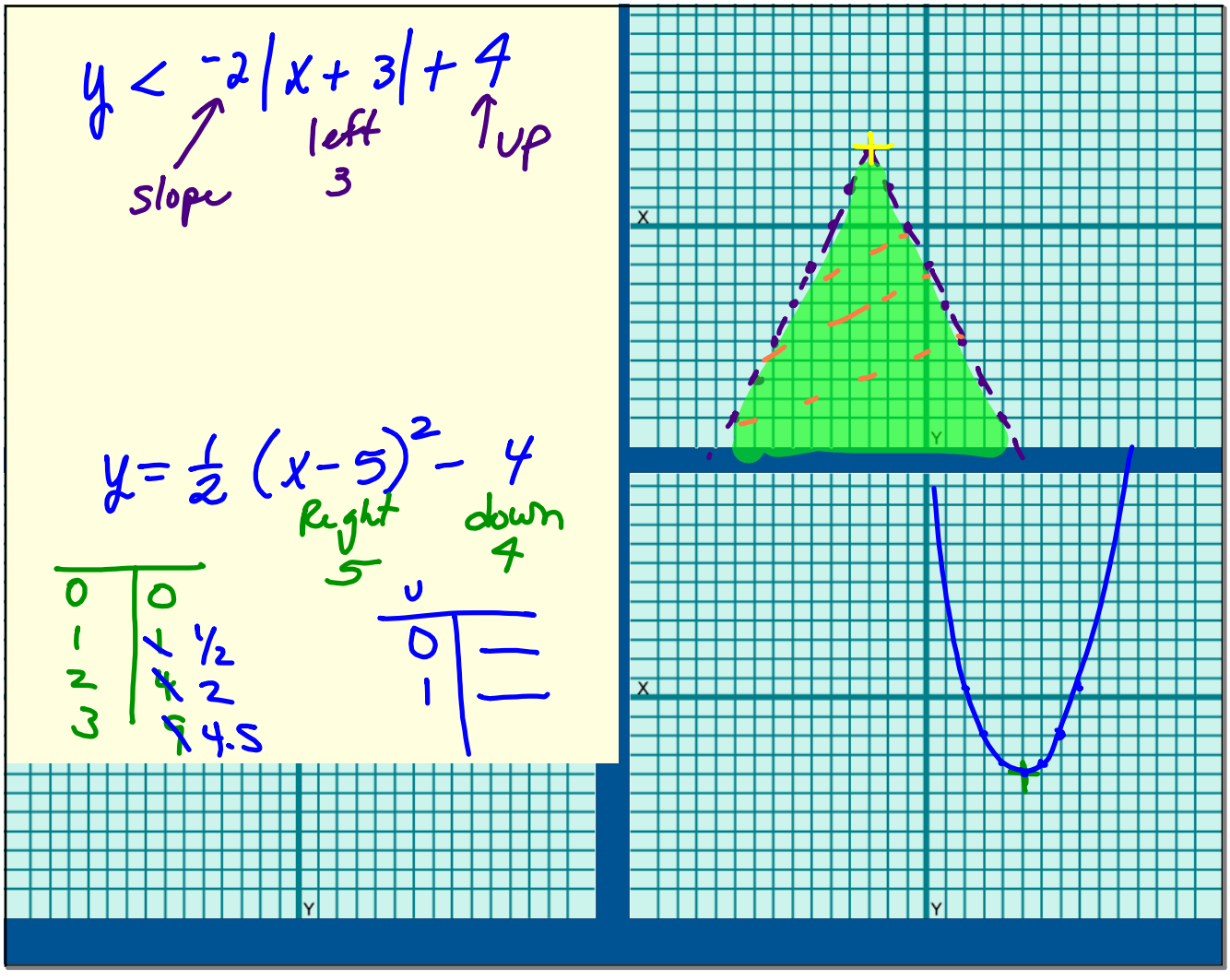

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Systems of Equations

1) substitution
2) elimination
3) Cramer's
4) Matrix eq.
5) Graphing
- find intersection on calculator

$2x + 5y = 13$
$3x - 2y = -9$

$$x = \frac{\begin{vmatrix} 13 & 5 \\ -9 & -2 \end{vmatrix}}{\begin{vmatrix} 2 & 5 \\ 3 & -2 \end{vmatrix}} = \frac{-26 + 45 = 19}{-4 - 15 = -19} = -1$$

$$y = \frac{\begin{vmatrix} 2 & 13 \\ 3 & -9 \end{vmatrix}}{\begin{vmatrix} 2 & 5 \\ 3 & -2 \end{vmatrix}}$$

Elimination

-2 $2x + 4y - 3z = 14$

$1x - 2y + z = 12$

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

① $2x + 4y - 3z = 14$

$+-2x - 6y + 10z = -6$

$-2y + 7z = 8$

② Eliminate same variable

Use 2 different eqs.

$-4x - 8y + 6z = -28$

$4x - 2y + z = 12$

$-10y + 7z = -16$

$-10(3) + 7z = 16$

③ $-2y + 7z = 8$

$-1[+10y + 7z = 16]$

$8y = 24$

$y = 3$

Matrix Eq.

$-2x + 4y - 3z = 14$

$1x - 2y + z = 12$

$x + 3y - 5z = 3$

$$\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}^{-1} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 14 \\ 12 \\ 3 \end{bmatrix}$$

$[A]^{-1}$ $[X]$ $[B]$

$$\begin{bmatrix} 2 & 4 & -3 \\ 1 & -2 & 1 \\ 3 & 3 & -5 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 14 \\ 12 \\ 3 \end{bmatrix}$$

Complex Numbers

0.25 $i^1 = i$

0.5 $i^2 = -1$

0.75 $i^3 = -i$

0.00 $i^4 = 1$

$2i^{75^3} - 4i^{1000^4}$

$2(-i) - 4(1)$

$-2i - 4$

$\frac{25}{4} = 18.\overset{3}{15}\frac{3}{4}$

$\frac{1000}{4} = 250$

$\sqrt{28} + \sqrt{63}$

$4 \cdot 7 \quad 9 \cdot 7$

$= 2\sqrt{7} + 3\sqrt{7}$

$= 5\sqrt{7}$

$\frac{5}{3\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$

$= \frac{5\sqrt{7}}{21}$

FOIL

$\frac{2+\sqrt{7}}{4-2\sqrt{7}} \cdot \frac{(4+2\sqrt{7})}{(4+2\sqrt{7})} =$ ↑ conjugate

FL

$\frac{8 + 4\sqrt{7} + 4\sqrt{7} + 14}{16 - 28}$

$\frac{-22 + 8\sqrt{7}}{-12}$

$\frac{11 - 4\sqrt{7}}{6}$

$\sqrt{-18} \cdot \sqrt{-12}$

$-1 \cdot 9 \cdot 2 \quad 4 \cdot 3$

$= 3i\sqrt{2} \cdot 2i\sqrt{3}$

$= -6\sqrt{6}$

FOIL

$\frac{5+2i}{3-4i} \cdot \frac{(3+4i)}{(3+4i)}$

FL

Solving Quadratic Equations

1) Factoring
2) Quadratic formula
~~3) Compl. Square~~
4) Graphing on calculator

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$10x^2 - 11x = 6$

$10x^2 - 11x - 6 = 0$

$1 \cdot 10$, $5 \cdot 2$ — $1 \cdot 6$, $2 \cdot 3$

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

$+4x$, $-15x$

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

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

$x=-2/5 \quad x=3/2$

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Revenue = (# sold)(price)

$(40+10x)(100-5x)$

Find vertex.

Current:
40 trees @ $100
↓ $5 sell 10 more
What price to maximize revenue

$h(t) = \frac{1}{2}at^2 + V_0t + S_0$

$a = -32\ ft/s^2$ $a = -9.8\ m/s^2$

ax^2+bx+c

Vertex:

$x = \frac{-b}{2a}$

y = Sub in x coord

$y=(x-p)(x-q)$

$x-p=0 \quad x-q=0$

$x=p \quad x=q$

Vertex $x = \frac{p+q}{2}$