1.3 Arithmetic Sequences

- seq. developed by adding a constant difference.

ex $1, 4, 7, 10, 13, \ldots$ $d = +3$, $u_1 = 1$

Represent them Recursively & explicitly

Recursive

$$\begin{cases} u_1 = 1 \\ u_n = u_{n-1} + 3 \end{cases}$$

$u_{30} = u_{30-1} + 3$

$u_{30} = u_{29} + 3$

Explicit

$a_n = a_1 + d(n-1)$

$u_n = 1 + 3(n-1)$

$u_n = 1 + 3n - 3$

$\boxed{u_n = 3n - 2}$

$u_{30} = 3 \cdot 30 - 2$

$90 - 2$

$u_{30} = 88$

$2, 4, 6, 7, 9, 11, \ldots$ NO

$10, 6, 2, -2, -6, \ldots$ $d = -4$, $u_1 = 10$

Recursive

$$\begin{cases} u_1 = 10 \\ u_n = u_{n-1} - 4 \end{cases}$$

Explicit

$u_n = -4n + 14$

$u_n = 10 - 4(n-1)$

1.3 Continue

$u_5 = 22$ $\quad u_{11} = 64$

$d = 7$
$u_1 = -6$

$-6, 1, 8, 15, 22, 29, 36, 43, 50, 57, 64$

5 ✓ ✓ ✓ ✓ ✗ ✗ ✗ ✗ ✗ ✗ ✗

$(5, 22)$
$(11, 64)$

$$\frac{64-22}{11-5} = \frac{42}{6} = \frac{7}{1}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

R $\begin{cases} u_1 = -6 \\ u_n = u_{n-1} + 7 \end{cases}$

E: $u_n = 7n - 13$

$$\sum_{n=1}^{40} (3n - 1)$$

$2 + 5 + 8 + 11 = 26$

$3 \cdot 1 - 1 = 2$
$3 \cdot 2 - 1 = 5$
$3 \cdot 3 - 1 = 8$
$3 \cdot 4 - 1 = 11$

Sum(seq(3n-1, n, 1, 40))

1.4 Lines.

- Find slope, parallel, perpendicular
- arithmetic seq. & Lines.
- graph Lines.
- write equations of Lines.

$a_n = 4n - 3$

$$\text{slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$$

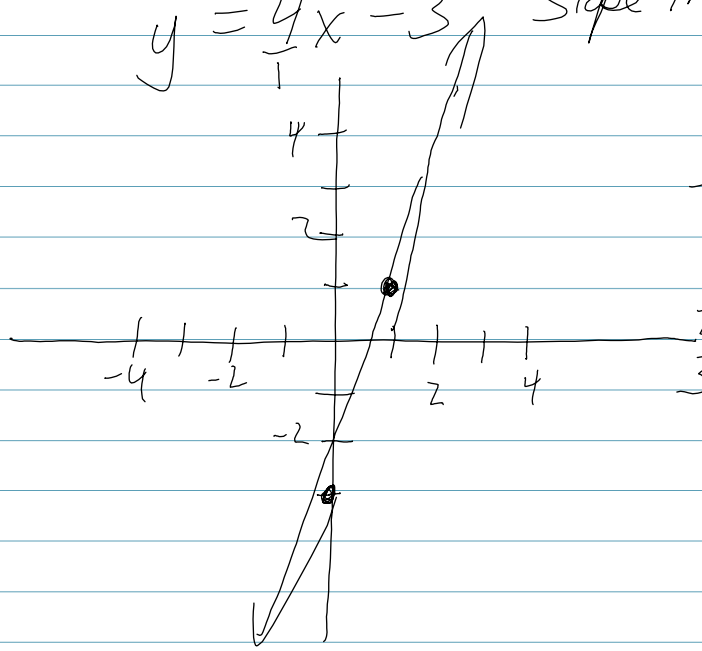
$(2, -3)$ $(0, 5)$

$$\frac{-3 - 5}{2 - 0} = \frac{-8}{2} = \frac{-4}{1}$$

$\perp$ $\text{Line}_1 = -\frac{4}{1}$

$\text{Line}_2 = \frac{1}{4}$

$y = \frac{4}{1}x - 3$ slope-intercept Form



x	y
0	-3
1	1
2	5
3	9

1.4 con't Write equations of Lines.

(2, -3) (0, 5)

$m = -4$

Point - slope

$y - y_1 = m(x - x_1)$

$y - 5 = -4(x - 0)$

$y - 5 = -4x + 5$

$+5 \quad +5$

$y = -4x + 5$

$y = mx + b$

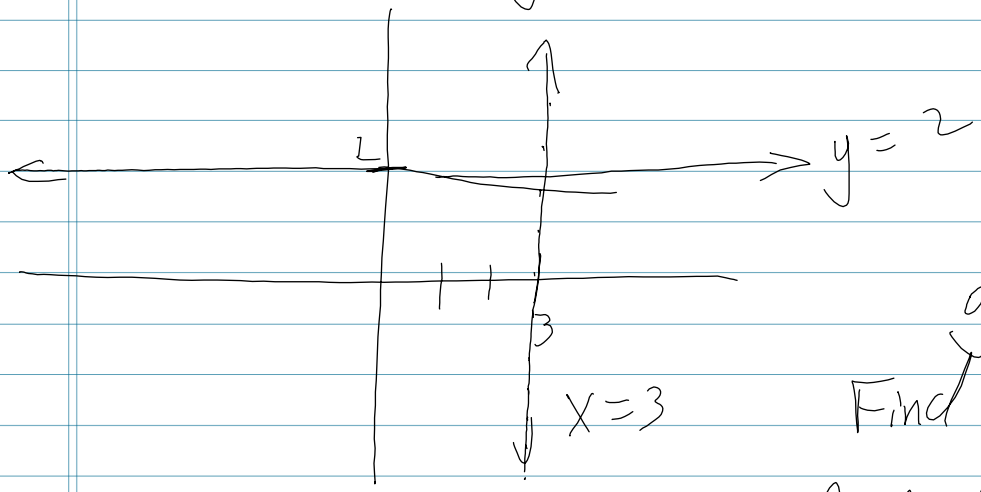
$y = -4x + b$

$5 = -4 \cdot 0 + b$

$5 = b$

$y = -4x + 5$

Cal. do LinReg.



given $y = \frac{-2}{3}x + 4$

Find the equation of a perpendicular line to the given that goes through the point (-1, -3)

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

1.6 Geometric Sequences.

$u_1 = 5$ $r = -4$

$u_3 = 80$ $u_6 = -5120$

5, -20, 80, -320, 1280, -5120

1, -4, 2, -4, 3, 4, -4, 5, 6

$u_n = 5 \cdot (-4)^{n-1}$

Explicit form geo. seq $u_n = u_1 \cdot r^{n-1}$

$u_6 = u_1 \cdot r^5$ $u_3 = u_1 \cdot r^2$

$-5120 = u_1 \cdot r^5$ $80 = u_1 r^2$

$\frac{-5120}{80} = \frac{u_1 \cdot r^5}{u_1 r^2}$

$\sqrt[3]{-64} = \sqrt[3]{r^3}$

$-4 = r$

1.6/4-40#4

Recursive

$u_1 = 5$

$u_n = (-4) \cdot u_{n-1}$

$\sum_{n=1}^{8} 5(-4)^{n-1}$

- can cal.
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$\sum_{n=1}^{k} u_n = u_1 \left(\frac{1-r^k}{1-r}\right)$

$5\left(\frac{1-(-4)^8}{1-(-4)}\right) = 5\left(\frac{1-65536}{5}\right)$

$5\left(\frac{-65535}{5}\right)$