Problem 1 Topology of real subsets

a) interior point → ~~{2, 7}~~ (-2, 7)

exterior point $(-\infty, -2) \cup (7, \infty)$

boundary points = {-2, 7}

b) A: int = $(-2, 2)$

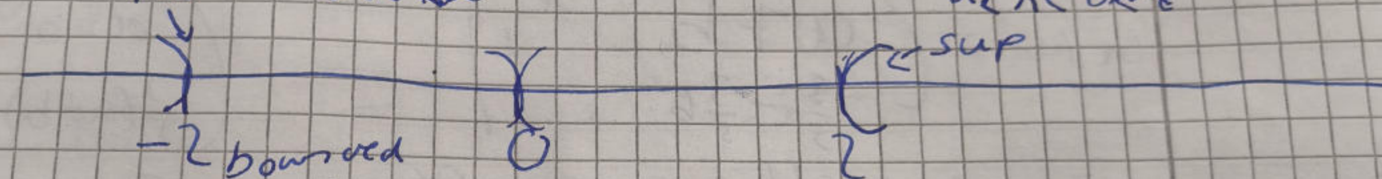
bound = -2

ext = $(-\infty, -2] \cup (2, \infty)$

c) A ext {-7, 4} int (2, 7)

Problem 2 Topology of real (subsets)

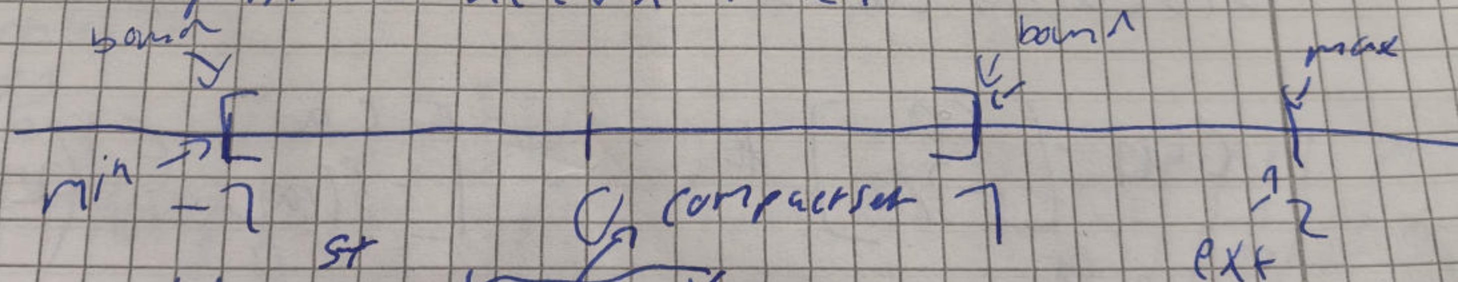
a) $-2 < x < 0$ $x < 2$



open set because every point x is in the interior point of A and it is bounded from -2 to 2

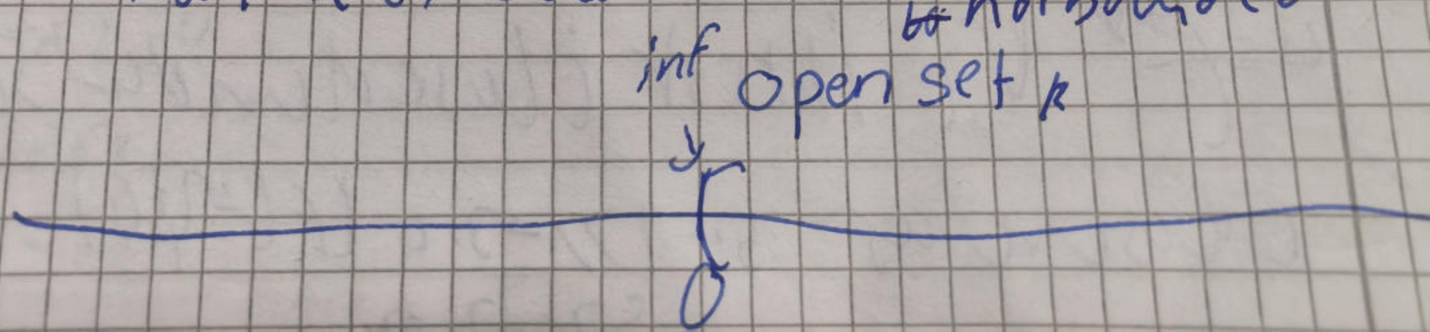
point $x \in 2 \vee -7 < x < 7$

b)



It is closed and bounded as the finite union of closed sets is closed, It is bounde d because there is no element greater than 2 or below -7

c) not bounded open set



Problem 3

$V_1 = 3x_1 + 5x_2 = 0$ or $5x_2 = -3x_1$

check zerovector

$5 \cdot 0 = 3 \cdot 0$
$0 = 0$

$\begin{pmatrix} 0 \\ 0 \end{pmatrix} = 3 \cdot 0 + 5 \cdot 0 = 0$
$0 = 0$ ✓

$-3x_1 = 5x_2$

$-\frac{3}{5}x_1 = x_2$

$x_1 = \frac{3}{5} x_2$

check addition

$u = \begin{pmatrix} a \\ -\frac{3}{5}a \end{pmatrix}$ $v = \begin{pmatrix} b \\ -\frac{3}{5}b \end{pmatrix}$

$u+v = \begin{pmatrix} a+b \\ -\frac{3}{5}a - \frac{3}{5}b \end{pmatrix} = \begin{pmatrix} a+b \\ -\frac{3}{5}(a+b) \end{pmatrix} \in V_1$

~~Thats of the form~~

so thats in the ~~sub~~ set

3) scalar closure

$c(u) = \begin{bmatrix} ca \\ -\frac{3}{5}(ca) \end{bmatrix} = \begin{bmatrix} ca \\ -\frac{3}{5}(ca) \end{bmatrix} \in V_1$

✓

$V_2 = 5 \cdot 0 \geq -3 \cdot 0$ ✓

V_2 is not closed under scalar closure as $5 \cdot -1 \geq -3 \cdot 0$ if $(-1, 0)$

$-5 \geq -3$

V_3 = not ~~closed~~ a a subspace as ~~w~~ the zero vector ~~negates~~ is not part of the subspace

Problem 4

2 -1 3 -2

0 0 3 -2 · - -3