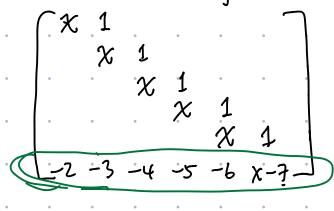
#1. Express the determinant of:



as a poly. in x.

<u>Sel</u>" Cofactor expression along the last row:

$$(-1)^{6+1}(-2)-1+(1)^{6+2}(-3)\chi+\cdots+(1)^{6+5}(-6)\chi+(1)^{4+6}(\chi-1)\chi^{5}$$

$$= \chi^6 - 7\chi^5 + 6\chi^4 - 5\chi^3 + 4\chi^2 - 3\chi + 2.$$

#2. A: 4x4, di, is GIR9. Suppose the first time rows of A are given by di, is, vitis. Can one determine det (A)=?

Sel". det(A)=0.

Claim: A is not invertible.

the rows of A are l.d. by assumption.

we proved that A invertible \Leftrightarrow A Tinvertible.

hence ATNOT invertible \Leftrightarrow A NOT invertible.

$$T: Poly \leq 3 \longrightarrow \mathbb{R}^2$$

$$p \longmapsto \begin{bmatrix} Plo \\ Pl1 \end{bmatrix}$$

#3. Consider

- (1) Find a set of polyasuralis) in Ker(T) that are lii.

 and span Ker(T)
- (2) Find a set of vector(s) in Im(T) that are live.

 and span Im(T).

Sal": (1)
$$p \in \text{Ker}(T) \Leftrightarrow p(o) = p(1) = 0$$
.
 $\Leftrightarrow p(x) = L(x) \cdot x(x+1) \text{ for some.}$

$$\text{Inear fin } L(x) = Ax+B.$$

$$(STrue \ p \in \text{Poly} \in 3).$$

$$\text{Hence } \text{Ker}(T) = \text{Span} \left\{ x(x+1), x^2(x+1) \right\}. \square$$

(2) Strue
$$-\chi_{+1} \mapsto \begin{bmatrix} 1 \\ 6 \end{bmatrix}$$
 and $\chi_{+} \mapsto \begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

So $Im(T) = \mathbb{R}^2 = Span\{[0], [i]\}$.