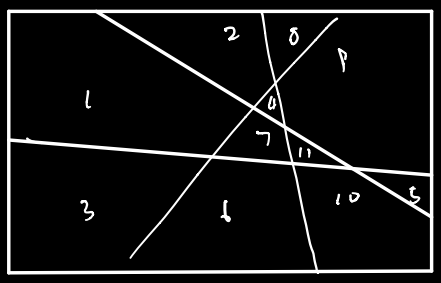
# Problem 1 (Region in $\mathbb{R}^2$)




| # lines | region | |
|---|---|---|
| 0 | 1 | |
| 1 | 2 | 1 |
| 2 | 4 | 2 |
| 3 | 7 | 3 |
| 4 | 11 | 4 |

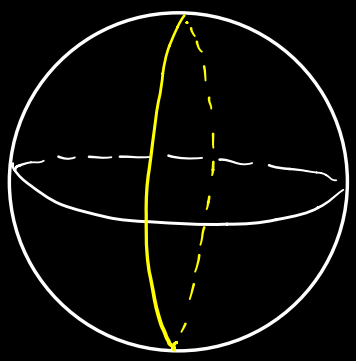
Find a formula for $L_n$ = # regions

$$1 + \sum_{n=1}^{\infty} n$$

$$1 + \frac{n(n+1)}{2}$$

## Problem 2 ( Region in $S^2$ )

Find $C_n$ = # regions

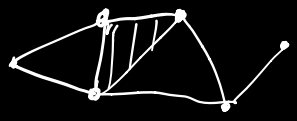


| # lines | # regions | |
|---|---|---|
| 0 | 1 | |
| 1 | 2 | +1 |
| 2 | 4 | +2 |
| 3 | 8 | +4 |
| 4 | 14 | +6 |

$$C_n = C_{n-1} + 2(n-1)$$

## Problem 3 (Euler Characteristic)

(a) If $G$ is a graph in $\mathbb{R}^2$, then $V - E + F = 1$



(b) If $G$ is a graph in $S^2$, then $V - E + F = 2$

## Problem 4 (Polytope solids)

Prove that the only regular polytope are 1  2  3 .. 4 .. 5 ..

Problem 5 (Brussel sprouts)