Ex: 1
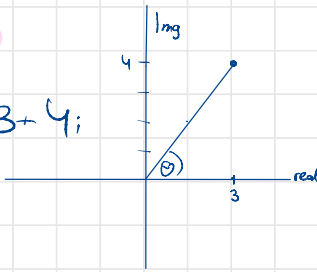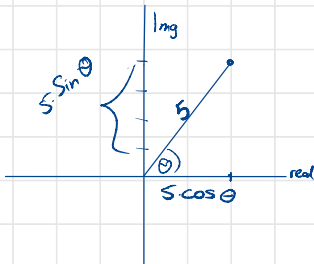
.1 $z = 3 + 4i$

$$= \frac{1}{2} \cdot 2\ln 5 + 0.93i$$

$$1.61 + 0.93i$$

$$\theta = \tan^{-1}\left(\frac{4}{3}\right) \approx 0.927$$

$$r = \sqrt{3^2 + 4^2} = 5$$

$$z = 5 \cdot \cos\theta + i \cdot 5 \cdot \sin\theta$$

$$z = 5\left(\cos\theta + i\sin\theta\right)$$

$$z = 5e^{i\theta}$$

$$z = 5e^{i\tan^{-1}\left(\frac{4}{3}\right)}$$

② $\ln(ab) = \ln a \cdot \ln b$ $r = \sqrt{a^2 + b^2}$

$$\ln\left(re^{i\theta}\right) = \ln r + \ln\left(e^{i\theta}\right) = \frac{1}{2}\ln\left(a^2 + b^2\right) + i\theta \ln e$$

$\ln e = 1$ $\theta = \tan^{-1}\left(\frac{b}{a}\right)$

$$\frac{1}{2}\ln\left(a^2 + b^2\right) + i\tan^{-1}\left(\frac{b}{a}\right)$$

$$\ln z = \frac{1}{2}\ln\left(3^2 + 4^2\right) i\tan^{-1}\left(\frac{4}{3}\right)$$

Part 2

.3 $-2x + 2z = -4$

$-4x + z + y = 4$

$x + y - z = 0$

$$a = \begin{pmatrix} -2 & 0 & 2 & | & -4 \\ -4 & 1 & 1 & | & 4 \\ 1 & 1 & -1 & | & 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 1 & -1 & | & 0 \\ -4 & 1 & 1 & | & 4 \\ -2 & 0 & 2 & | & -4 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & -1 & | & 0 \\ 0 & 5 & -3 & | & 4 \\ 0 & 2 & -1 & | & -4 \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 1 & 1 & -1 & | & 0 \\ 0 & 1 & -\frac{3}{5} & | & \frac{4}{5} \\ 0 & 2 & -1 & | & -4 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & -\frac{2}{5} & | & 0 \\ 0 & 1 & -\frac{3}{5} & | & \frac{4}{5} \\ 0 & 2 & -1 & | & -4 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & -\frac{2}{5} & | & -\frac{4}{5} \\ 0 & 1 & -\frac{3}{5} & | & \frac{4}{5} \\ 0 & 0 & 1 & | & -28 \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 1 & 0 & 0 & | & -12 \\ 0 & 1 & 0 & | & -16 \\ 0 & 0 & 1 & | & -28 \end{pmatrix} \rightarrow \left(\frac{1}{-4}\right) \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \\ 7 \end{pmatrix}$$

4.1 $A \cdot (x,y) = (1,1)$

General solution for $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $a+b=2 \rightarrow b=2-a$

$c+d=3 \rightarrow d=3-c$

$A = \begin{pmatrix} a & 2-a \\ c & 3-a \end{pmatrix}$

4.2 $A \cdot (x,y) = (1,1)$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{matrix} a+b=-1 \rightarrow b=-1-a \\ c+d=1 \rightarrow d=1-c \end{matrix}$

.5 player : total games : 30

no Score : 0.5

Score 1 : 0.25

Score 2 : 0.15

Score 3 : 0.1

$30 \left((0.5 \cdot 0) + (0.25 \cdot 1) + (0.15 \cdot 2) + (0.1 \cdot 3) \right) =$

Gym = 0.4

3 options to see each other:

(1) Bob went to the gym exactly 5 times: $(0.4)^5 \cdot (0.6)^2$

(2) Bob went 6 times: $(0.4)^6 \cdot (0.6)^1$

(3) Bob went 7 times: $(0.4)^7$

$\binom{7}{5}(0.4)^5 \cdot (0.6)^2 + \binom{7}{6}(0.4)^6 \cdot (0.6)^1 + \binom{7}{7}(0.4)^7$

7 days
5 of them
went