P3.

To prove

$$x_n = \frac{2^n}{n!}\left(\frac{1!(n-1)!}{1} + \frac{2!(n-2)!}{2} + \cdots + \frac{n!(n-n)!}{n}\right)$$

$$= \frac{2^1}{1} + \frac{2^2}{2} + \cdots + \frac{2^n}{n}$$

when $n=1$

it is obviously true

when $n=n+1$

$$x_{n+1} = \frac{2^{n+1}}{(n+1)!}\left(\frac{1!\,n!}{1} + \cdots + \frac{(n+1)!\,0!}{n+1}\right)$$

$=$

P_4 if T_p is infinite

then p_n is pairwise distinct

there exist a_n s.t. $p_{a_n} \to q \in [a,b]$

$|p_{a_n} - q| < \varepsilon$

contradiction

P_5

P6

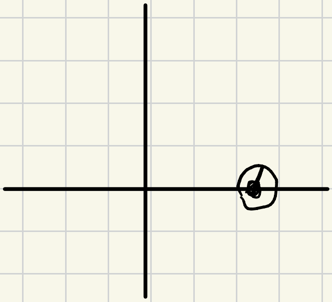
$$\|M\| = \sup_{x\in\mathbb{R}^n/\{0\}} \frac{\|Mx\|}{\|x\|} = \sup |\lambda_i|$$

$p(A)$ have eigenvalues $p(\lambda_i)$

thus

for all $k \in \mathbb{N}$

$$\sup | \lambda_i^k - \lambda_i^{k-1} | \le \frac{1}{2002k}$$



when $k=1$

get : $\lambda_i = 1+\rho e^{i\theta}$ $\left(0\le\rho\le\frac{1}{2002}, \quad \theta\in[0,2\pi] \right)$

when $k=j$

get $\sup \left| \rho e^{i\theta} (1+\rho e^{i\theta})^{j-1} \right| \le \frac{1}{2002j}$

thus

$$\rho\cdot(1+\rho)^{j-1} \le \frac{1}{2002j}$$

$$\rho\,[1+(j-1)\rho] \le \frac{1}{2002j}$$

$$\rho+\rho^2(j-1) - \frac{1}{2002j} \le 0$$

$$\rho \le \frac{-1+\sqrt{(j-1)^2+\frac{4}{2002j}}}{2(j-1)}$$

$k\to\infty$

$j\to\infty$

$(1+\rho)^k$