

Константин 45028
Янгов Информатика 1 - 05

3+II:1 DSN № 2

$$\begin{vmatrix} -6 & 8 & 8 & 8 & 8 & \dots & 8 \\ 2 & -3+n & 1 & -3 & -3 & -3 & \dots & -3 \\ 2 & -3 & -3+12 & -3 & -3 & -3 & \dots & -3 \\ 2 & -3 & -3 & -3+13 & -3 & -3 & \dots & -3 \\ 2 & -3 & -3 & -3 & -3+34 & -3 & \dots & -3 \\ & & & & & & \dots & \\ 2 & -3 & -3 & -3 & -3 & -3 & \dots & -3+(n-1).n \end{vmatrix}$$

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$$\begin{vmatrix} -2 & \frac{8}{3} & \frac{8}{3} & \frac{8}{3} & \dots & \dots & \frac{8}{3} \\ 0 & -3+10.1+\frac{8}{3} & -3+\frac{8}{3} & -3+\frac{8}{3} & \dots & \dots & -3+\frac{8}{3} \\ 0 & -3+\frac{8}{3} & -3+12+\frac{8}{3} & -3+\frac{8}{3} & \dots & \dots & -3+\frac{8}{3} \\ -3+\frac{8}{3} & & & & \dots & \dots & \} \\ & & & & & & \\ 0 & -3+\frac{8}{3} & -3+\frac{8}{3} & - & - & -3+(n-1).n & \frac{8}{3} \end{vmatrix}$$

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$$\begin{vmatrix} -\frac{1}{4} & 1 & 1 & 1 & \dots & & \frac{1}{3} \\ -\frac{1}{4} & n.1 & 0 & 0 & \dots & & 0 \\ -\frac{1}{4} & 0 & 12 & 0 & \dots & & , \\ & & 0 & 2.3 & \dots & & | \\ -\frac{1}{4} & 0 & 0 & 0 & \dots & & (n-1).n \\ \nearrow 4.1 & \nearrow 4.2 & \nearrow 1 & \nearrow 1 & \dots & & \end{vmatrix}$$

(*)

0 n.1

6.2

2.3

~(n-0.n)

$$\Rightarrow \det t = \oplus (n \cdot 1) \cdot (1 \cdot 2) \cdot (2 \cdot 3) \dots$$

$$\left| \begin{array}{ccc|c} -6 & 8 & 8 & 8 \\ 2 & -3+n+1 & -3 & -3 \\ 2 & -3 & -3+1 \cdot 2 & -3 \\ \hline 2 & -3 & -3 & -3+n-1 \cdot n \end{array} \right| \cdot \frac{3}{8}$$

$$= \left| \begin{array}{ccc|c} -6 & 8 & 8 & 8 \\ -\frac{1}{4} & n & 0 & 0 \\ -\frac{1}{4} & 0 & 1 \cdot 2 & 0 \\ \hline -\frac{1}{4} & 0 & 0 & (n-1)n \end{array} \right|$$

$\frac{1}{4n} \swarrow \quad \searrow \frac{1}{4(n-1)n}$

$$= \left| \begin{array}{ccc|c} -6 + 2 \left(\frac{1}{4} + \frac{1}{12} + \dots + \frac{1}{4n(n-1)} \right) & 0 & \vdots & n \\ 0 & \ddots & & (n-1)n \\ 0 & & & (n-1)n \end{array} \right|$$

$$= -4(n!)^2$$

3.4.4.2

a) $\det A = ?$ $A = \begin{pmatrix} 4 & -5 & -5 & 7 \\ 7 & 4 & -5 & -5 \\ -5 & 7 & 4 & -5 \\ -5 & -5 & 7 & 4 \end{pmatrix} =$

$$= 4 \cdot (-1)^{1+1} \begin{vmatrix} 4 & -5 & -5 \\ 7 & 4 & -5 \\ -5 & 7 & 4 \end{vmatrix} + (-5) \cdot (-1)^{1+2} \begin{vmatrix} 7 & -5 & -5 \\ -5 & 4 & -5 \\ -5 & 7 & 4 \end{vmatrix}$$

$$+ (-5) \cdot (-1)^{1+3} \begin{vmatrix} 7 & 4 & -5 \\ 5 & 7 & -5 \\ -5 & -5 & 4 \end{vmatrix} + 7 \cdot (-1)^{1+4} \begin{vmatrix} 7 & 4 & -5 \\ -5 & 7 & 4 \\ -5 & -5 & 7 \end{vmatrix} =$$

$$= 4 \cdot (-441) + 5 \cdot 207 - 5 \cdot (-99) + 7 \cdot 243 =$$

$$= -1764 + 1035 + 495 - 1701 =$$

$$= 1530 - 3465 = -1935 \quad \checkmark$$

d) $F = A \cdot W$

$$F = \begin{pmatrix} 4 & -5 & -5 & 7 \\ 7 & 4 & -5 & -5 \\ -5 & 7 & 4 & -5 \\ -5 & -5 & 7 & 4 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & -1 \\ 1 & -i & -1 & i \end{pmatrix}$$

$$F = \begin{pmatrix} 4+5i-5, 1+7i & 4 \cdot 1 - 5i + 5i - 7i & 4 \cdot 1 + 5i - 5i - 7i & 4+5i+5+7i \\ 7+4i-5-5 & 7+4i+5+5i & 7-4-5+5 & 7-i+i-5i \\ -5+7+4-5 & -5+7-i-H+5i & -5+7+4+5 & -5+7-i-5i \\ -5-5+7+4 & -5-5i-7-4i & -5+5+7+4 & -5+5-7+4i \end{pmatrix}$$

$$F = \begin{pmatrix} 1 & 9-12i & -3 & 9+12i \\ 1 & 12+9i & 3 & 12-9i \\ 1 & -9+12i & -3 & -9-12i \\ 1 & -12-9i & 3 & -12+9i \end{pmatrix}$$

$$F = \begin{pmatrix} 1 & 9-12i & -3 & 9+12i \\ 1 & 12+9i & 3 & 12-9i \\ 1 & -9+12i & -3 & -9-12i \\ 1 & -12-9i & 3 & -12+9i \end{pmatrix}$$

$$G = W \cdot D$$

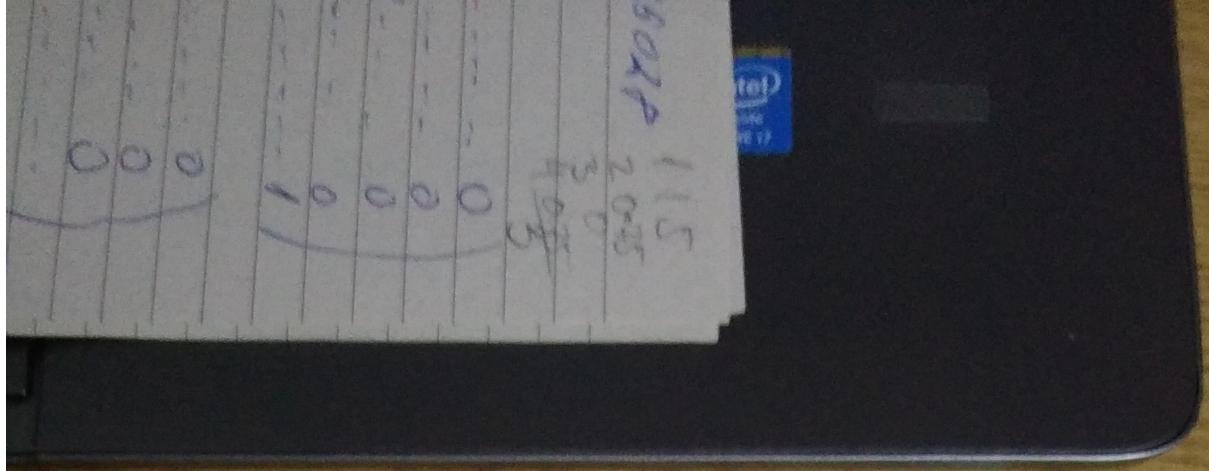
$$G = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & -1 \\ 1 & -i & -1 & i \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 9-12i & 0 & 0 \\ 0 & 0 & -3 & 0 \\ 0 & 0 & 0 & 9+12i \end{pmatrix} =$$

$$G = \begin{pmatrix} 1 & 9-12i & -3 & 9+12i \\ 1 & 12+9i & 3 & 12-9i \\ 1 & 12i-9 & -3 & 12i-9 \\ 1 & -12-9i & 3 & -12+9i \end{pmatrix}$$

$$\text{B)} \quad \text{det } F = 1 \cdot (-1)^{1+1} \begin{vmatrix} 12+9i & 3 & 12-9i \\ -9+12i & -3 & -9-12i \\ -12-9i & 3 & -12+9i \end{vmatrix} +$$

$$+ (9-12i) \cdot (-1)^{1+2} \begin{vmatrix} 1 & 3 & 12-9i \\ 1 & -3 & -9-12i \\ 1 & 3 & -12+9i \end{vmatrix} +$$

$$+ (-3) \cdot (-1)^{1+3} \begin{vmatrix} 1 & 12+9i & 12-9i \\ 1 & -9+12i & -9-12i \\ 1 & -12-9i & -12+9i \end{vmatrix} +$$



$$F_1 + (9+12i)(-1) \begin{array}{c} \\ \left| \begin{array}{ccc} 1 & 12+9i & 3 \\ 1 & 12i-9 & -3 \\ 1 & -12-9i & 3 \end{array} \right| \end{array} =$$

$(= 675 + 1350i - 675 + 1350i; m)$

~~2700i - (9-12i)(144-108i) - 981i - 81 - (9+12i)(144-108i)~~

$$= 2700i - (9-12i)(144-108i) - 981i - 81 - (9+12i)(144-108i)$$
$$= 2700i + 2700i + 2943i + 243 - 256 - 2592 - \dots$$

$$F = G \Rightarrow \det F = \det G$$

3 Aufgabe:

a) $A = \begin{pmatrix} 8 & 10 \\ 0 & 8 \end{pmatrix}$, $A^{90} = ?$

$$A^{90} = \left(\begin{pmatrix} 8 & 0 \\ 0 & 8 \end{pmatrix} \cdot \begin{pmatrix} 0 & 10 \\ 0 & 0 \end{pmatrix} \right)^{90} =$$

$$= \begin{pmatrix} 8^{90} & 0 \\ 0 & 8^{90} \end{pmatrix} + 90 \begin{pmatrix} 8^{89} & 0 \\ 0 & 8^{89} \end{pmatrix} \begin{pmatrix} 0 & 10 \\ 0 & 0 \end{pmatrix} =$$

$$= \begin{pmatrix} 8^{90} & 0 \\ 0 & 8^{90} \end{pmatrix} + 90 \begin{pmatrix} 0 & 8^{89} \\ 0 & 0 \end{pmatrix} =$$

$$\cancel{2} \cdot \begin{pmatrix} 8^{90} & 0 \\ 0 & 8^{90} \end{pmatrix} = [64]^{90} = \begin{pmatrix} 8^{90} & 900 \cdot 8^{89} \\ 0 & 8^{90} \end{pmatrix}$$

5) $B = f(A)$, $f(x) = -7x^4 + 4x^3 - 5x^2 - 9x + 3$

$$A^4 = x^2 \cdot x^2 = \begin{pmatrix} a^2 & 2ab \\ 0 & a^2 \end{pmatrix} \begin{pmatrix} a^2 & 2ab \\ 0 & a^2 \end{pmatrix} = \begin{pmatrix} a^4 & 4a^3b \\ 0 & a^4 \end{pmatrix}$$

$$A^3 = \begin{pmatrix} a^3 & 3a^2b \\ 0 & a^3 \end{pmatrix} \Rightarrow A^n = \begin{pmatrix} 0^n & n \cdot a^{n-1}b \\ 0 & a^n \end{pmatrix}$$

$$\Rightarrow B = -7 \begin{pmatrix} 8^4 & 4 \cdot 8^3 \cdot 10 \\ 0 & 8^4 \end{pmatrix} + 4 \cdot \begin{pmatrix} 8^3 & 3 \cdot 8^2 \cdot 10 \\ 0 & 8^3 \end{pmatrix} - 5 \begin{pmatrix} 8^2 & 2 \cdot 8 \cdot 10 \\ 0 & 8^2 \end{pmatrix} - 9 \begin{pmatrix} 8 & 10 \\ 0 & 8 \end{pmatrix} + 3$$

$$B = \begin{pmatrix} -28,672 & -143,360 \\ 0 & -28,672 \end{pmatrix} + \begin{pmatrix} 2048 & 7920 \\ 0 & 2048 \end{pmatrix} +$$

$$+ \begin{pmatrix} -320 & -800 \\ 0 & -320 \end{pmatrix} + \begin{pmatrix} -72 & -90 \\ 0 & -72 \end{pmatrix} + 3 =$$

$$B = \begin{pmatrix} -27,016 & -142,330 \\ 0 & -27,016 \end{pmatrix} + \begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix} =$$

$$= \begin{pmatrix} -27,013 & -142,330 \\ 0 & -27,015 \end{pmatrix} N$$

$$6) AB \stackrel{?}{=} BA$$

$$\underbrace{\begin{pmatrix} 8 & 10 \\ 0 & 8 \end{pmatrix} \begin{pmatrix} -27013 & -142330 \\ 0 & -27015 \end{pmatrix}}_{AB} \stackrel{?}{=} \begin{pmatrix} -27013 & -142330 \\ 0 & -27015 \end{pmatrix} \begin{pmatrix} 8 & 10 \\ 0 & 8 \end{pmatrix}$$

$$AB = \begin{pmatrix} 8 \cdot (-27013) + 10 \cdot 0 & 8 \cdot (-142330) + 10 \cdot (-27015) \\ 0 + 0 & 0 + 8 \cdot (-27015) \end{pmatrix}$$

$$AB = \begin{pmatrix} -216104 & -1408790 \\ 0 & -216104 \end{pmatrix}$$

$$BA = \begin{pmatrix} -27013 \cdot 8 & -27013 \cdot 10 + 1 \cdot -142330 \cdot 8 \\ 0 & -27013 \cdot 8 \end{pmatrix}$$

$$BA = \begin{pmatrix} -216104 & -1408790 \\ 0 & -216104 \end{pmatrix}$$

$$\Rightarrow \underline{AB = BA}$$

$$3 \times 4 \quad A \times B = C$$

$$A = \begin{pmatrix} 1 & 1 & 1 \\ -4 & -3 & -3 \\ -4 & -8 & -7 \end{pmatrix}, \quad B = \begin{pmatrix} -1 & -3 & -3 \\ -3 & -8 & -6 \\ -3 & -6 & -1 \end{pmatrix}$$

$$C = \begin{pmatrix} -154 & -374 & -220 \\ 512 & 1242 & 728 \\ 978 & 2382 & 1414 \end{pmatrix}$$

$$XB = Y$$

$$Ay = C$$

$$\Rightarrow A|C \rightarrow \left(\begin{array}{ccc|ccc} 1 & 1 & 1 & -154 & -374 & -220 \\ 0 & 0 & 1 & -104 & -254 & -152 \\ 0 & -4 & -3 & 362 & 886 & +534 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -54 & -120 & -68 \\ 0 & 1 & 1 & -104 & -254 & -152 \\ 0 & 0 & 1 & -54 & -130 & -1142 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -54 & -120 & -68 \\ 0 & 1 & 0 & -50 & -124 & 990 \\ 0 & 0 & 1 & -54 & -130 & -1142 \end{array} \right) N$$

y

\Rightarrow

$$XB = y$$

$$B^T X^T = y^T \rightarrow \left(\begin{array}{ccc|ccc} -1 & -3 & -3 & -54 & -50 & -54 \\ -3 & -8 & -6 & -120 & -124 & -130 \\ -3 & -6 & -1 & -68 & 990 & -1142 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 0 & 3 & 3 & 54 & 50 & 54 \\ -3 & -8 & -6 & -120 & -124 & -130 \\ -3 & -6 & -1 & -68 & 990 & -1142 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 3 & 3 & 54 & 50 & 54 \\ 0 & 0 & 3 & 42 & 26 & 32 \\ 0 & 3 & 8 & 94 & 1140 & -980 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 0 & -6 & -72 & -28 & -42 \\ 0 & 1 & 3 & 42 & 26 & 32 \\ 0 & 0 & -1 & -32 & -1062 & -1076 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 0 & -6 & -72 & -28 & -42 \\ 0 & 1 & 3 & 42 & 26 & 32 \\ 0 & 0 & 0 & 32 & -1062 & 1076 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 120 & -6400 & 6414 \\ 0 & 1 & 0 & -54 & 3212 & -3196 \\ 0 & 0 & 1 & 32 & -1062 & 1076 \end{array} \right) \sim$$

$$\Rightarrow x = \left(\begin{array}{ccc} 120 & -54 & 32 \\ -6400 & 3212 & -1062 \\ 6414 & -3196 & 1076 \end{array} \right) \text{Not ok}$$