Домашнее задание
по теме „Определители"
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№1.2.59

$$\begin{vmatrix} 2 & -3 \\ 5 & -4 \end{vmatrix} = 2\cdot(-4) - 5\cdot(-3) = -8 + 15 = 7$$

№1.2.60.

$$\begin{vmatrix} \alpha & \beta \\ 0 & 0 \end{vmatrix} = \alpha\cdot 0 - \beta\cdot 0 = 0$$

№1.2.61

$$\begin{vmatrix} x^2 & x \\ xy^2 & y^2 \end{vmatrix} = x^2y^2 - xy^2x = 0$$

№1.2.62.

$$\begin{vmatrix} \alpha & 3\alpha \\ \beta & 3\beta \end{vmatrix} = \alpha\cdot 3\beta - 3\alpha\cdot\beta = 0$$

№1.2.63

$$\begin{vmatrix} \cos\varphi & \sin\varphi \\ \sin\varphi & \cos\varphi \end{vmatrix} = \cos^2\varphi - \sin^2\varphi = \cos 2\varphi$$

w 1.2.64.

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

$$= \cancel{x^3} - \cancel{x^3} - \cancel{x^2} - \cancel{x} + \cancel{x^2} + \cancel{x} + 1 =$$

$$= 1$$

w 1.2.65

$$\begin{vmatrix} 2x-3 & 4 \\ -x & -3 \end{vmatrix} = 0$$

$$(2x-3)(-3) - (-x) \cdot 4 = 0$$

$$-6x + 9 + 4x = 0$$

$$-2x + 9 = 0$$

$$x = \frac{9}{2}$$

$$x = 4{,}5$$

w 1.2.66.

$$\begin{vmatrix} x+3 & x+1 \\ x-1 & x-2 \end{vmatrix} = 0$$

$$(x+3)(x-2) - (x-1)(x+1) = 0$$

$$\cancel{x^2} + 3x - 2x - 6 - \cancel{x^2} + 1 = 0$$

$$x - 5 = 0$$

$$x = 5$$

№1.2.67

$$\begin{vmatrix} 3-x & x+2 \\ x+1 & x-1 \end{vmatrix} = 6$$

$(3-x)(x-1)-(x+1)(x+2)=6$

$3x-x^2-3+\cancel{x}-x^2-\cancel{x}-2x-2=6$

$\cancel{-2x^2+x-11=0}$

$\cancel{2x^2-x+11=0}$

$\cancel{D=1^2-4\cdot2\cdot11=}$

$-2x^2+x-5=6$

$-2x^2+x-11=0$

$D=1^2-4\cdot(-2)\cdot(-11)=-87$

Ответ: решений нет

№1.2.68

$$\begin{vmatrix} x-2 & y+3 \\ 1-y & x-2 \end{vmatrix} = -4$$

$(x-2)(x-2)-(1-y)(y+3)=-4$

$x^2-4x+4-y+y^2-3+3y+4=0$

$x^2-4x+4+y^2+2y+1=0$

$y^2+2y+1=(x-2)^2$

Пусть $x = 2$, тогда

$y^2 + 2y + 1 = 0$

$D = 2^2 - 4 \cdot 1 = 0$

$y = \frac{-2}{2} = -1$

Ответ: $x = 2$, $y = -1$

№1269

$$\begin{vmatrix} x-2 & y+3 \\ 7-y & x+4 \end{vmatrix} = -34$$

$(x-2)(x+4) - (7-y)(y+3) = -34$

$x^2 - 2x + 4x - 8 - 7y + y^2 - 21 + 3y + 34 = 0$

$\cancel{x^2 + 2x - 8 = 7y - y^2 + 21 - 3y - 34}$

$\cancel{x^2 + 2x - 8 = -y^2 + 4y - 13}$

Пусть $x = -4$, тогда

$-y^2 + 4y - 13 = 0$

$y^2 - 4y + 13 = 0$

$D = (-4)^2 - 4 \cdot 13 < 0 \Rightarrow$ решений нет

~~Пусть $x = 2$, тогда~~

$-y^2 + 4y = x^2 + 2x - 8 - 21 + 34$

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„Определители"

№1.2.69 (продолжение)

$-y^2+4y=x^2+2x+5$

$-y^2+4y-(x^2+2x+5)=0$

$D=4^2-4\cdot(-1)\cdot(-x^2-2x-5)=$

$=16-4x^2-8x-20=-4x^2-8x-4$

$y_1=\dfrac{-4+\sqrt{-4x^2-8x-4}}{-2}=$

$=2+\sqrt{\dfrac{-4x^2-8x-4}{4}}=$

$=2+\sqrt{-x^2-2x-1}$

$y_2=\dfrac{-4-\sqrt{-4x^2-8x-4}}{-2}=$

$=2-\sqrt{-x^2-2x-1}$

$x=-1$

$y=2\pm\sqrt{-(-1)^2-2\cdot(-1)-1}=2\pm\sqrt{0}=2$

Ответ: $x=-1$, $y=2$

w1.2.70

$$\begin{vmatrix} \sin 2x & -\sin 3x \\ \cos 2x & \cos 3x \end{vmatrix} = 0$$

$$\sin 2x \cos 3x + \cos 2x \sin 3x = 0$$

$$\sin(2x+3x) = 0$$

$$\sin 5x = 0$$

$$5x = \pi k, \ k \in \mathbb{Z}$$

$$x = \frac{\pi}{5} k, \ k \in \mathbb{Z}$$

w1.2.71.

$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 3 \\ 4 & 6 & 7 \end{vmatrix} = 1 \begin{vmatrix} 3 & 3 \\ 6 & 7 \end{vmatrix} - 1 \begin{vmatrix} 2 & 3 \\ 4 & 7 \end{vmatrix} + 1 \begin{vmatrix} 2 & 3 \\ 4 & 6 \end{vmatrix} =$$

$$= 3 \cdot 7 - 6 \cdot 3 - 2 \cdot 7 + \cancel{4 \cdot 3} + 2 \cdot 6 - \cancel{4 \cdot 3} =$$

$$= 21 - 18 - 14 + 12 = 1$$

w1.2.72

$$\begin{vmatrix} 1 & 1 & 0 \\ 2 & 3 & 1 \\ 0 & 2 & 3 \end{vmatrix} = 1 \begin{vmatrix} 3 & 1 \\ 2 & 3 \end{vmatrix} - 1 \begin{vmatrix} 2 & 1 \\ 0 & 3 \end{vmatrix} + 0 \begin{vmatrix} 2 & 3 \\ 0 & 2 \end{vmatrix} =$$

$$= 3 \cdot 3 - 2 \cdot 1 - 2 \cdot 3 + 0 \cdot 1 = 9 - 2 - 6 = 1$$

№1.2.73

$$\begin{vmatrix} -2 & 3 & 5 \\ 4 & 1 & -2 \\ 1 & -3 & 2 \end{vmatrix} = -2\begin{vmatrix} 1 & -2 \\ -3 & 2 \end{vmatrix} - 3\begin{vmatrix} 4 & -2 \\ 1 & 2 \end{vmatrix} + 5\begin{vmatrix} 4 & 1 \\ 1 & -3 \end{vmatrix} =$$

$$= -2(1\cdot 2-(-3)\cdot(-2)) - 3(4\cdot 2 - 1\cdot(-2)) + 5\cdot$$

$$\cdot(4\cdot(-3)-1\cdot 1) = -2\cdot(-4) - 3\cdot 10 + 5\cdot(-13) =$$

$$= 8 - 30 - 65 = -87$$

№1.2.74.

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = a\begin{vmatrix} c & a \\ a & b \end{vmatrix} - b\begin{vmatrix} b & a \\ c & b \end{vmatrix} + c\begin{vmatrix} b & c \\ c & a \end{vmatrix} =$$

$$= a(cb-a^2) - b(b^2-ac) + c(ab-c^2) =$$

$$= \cancel{abc} - a^3 - b^3 - \cancel{abc} + abc - c^3 =$$

$$= -a^3 - b^3 - c^3 + abc$$

№1.2.75

$$\begin{vmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & \gamma \end{vmatrix} = \alpha\beta\gamma$$ (остальные слагаемые нули)

7 9

w1.2.76

$$\begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{vmatrix} = 0 + 1\cdot1\cdot1 + 1\cdot1\cdot1 - 1\cdot0\cdot1 -$$

$$- 1\cdot1\cdot0 - 1\cdot1\cdot0 = 2$$

w1.2.77.

$$\begin{vmatrix} \cos\alpha & \cos\beta & 0 \\ \cos\alpha & 0 & \cos\gamma \\ 0 & \cos\beta & \cos\gamma \end{vmatrix} = \cos\alpha\cdot0\cdot\cos\gamma +$$

$$+ \cos\beta\cdot\cos\gamma\cdot0 + \cos\alpha\cdot\cos\beta\cdot0 -$$

$$- 0\cdot0\cdot0 - \cos\alpha\cdot\cos\beta\cdot\cos\gamma - \cos\beta\cdot\cos\gamma\cdot$$

$$\cdot\cos\alpha = -2\cos\alpha\cos\beta\cos\gamma$$

w1.2.78

$$\begin{vmatrix} 0 & x & 0 \\ x & 1 & x \\ 0 & x & 0 \end{vmatrix} = 0\cdot1\cdot0 + x\cdot x\cdot0 + x\cdot x\cdot0 - 0\cdot1\cdot0 -$$

$$- x\cdot x\cdot0 - x\cdot x\cdot0 = 0$$

~~w1.2.79~~

8)

„Определители"

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№1.2.79

$$\begin{vmatrix} 2 & 3 & 5 \\ 0 & -1 & 0 \\ 6 & 7 & 8 \end{vmatrix} = (-1)^{2+1} \cdot 0 \begin{vmatrix} 3 & 5 \\ 7 & 8 \end{vmatrix} + (-1)^{2+2} \cdot (-1) \begin{vmatrix} 2 & 5 \\ 6 & 8 \end{vmatrix} + (-1)^{2+3} \cdot 0 \begin{vmatrix} 2 & 3 \\ 6 & 7 \end{vmatrix} =$$

$$= -2 \cdot 8 + 6 \cdot 5 = -16 + 30 = +14$$

№1.2.80

$$\begin{vmatrix} 1 & 2 & 0 \\ 3 & 4 & 0 \\ 5 & 6 & 7 \end{vmatrix} = (-1)^{1+3} \cdot 0 \begin{vmatrix} 3 & 4 \\ 5 & 6 \end{vmatrix} + (-1)^{2+3} \cdot 0 \begin{vmatrix} 1 & 2 \\ 5 & 6 \end{vmatrix} + (-1)^{3+3} \cdot 7 \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} =$$

$$= 7(1 \cdot 4 - 3 \cdot 2) = 28 - 42 = -16$$

№1.2.81

$$\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 0 \end{vmatrix} = (-1)^{1+3} \cdot 3 \begin{vmatrix} 4 & 5 \\ 7 & 8 \end{vmatrix} + (-1)^{2+3} \cdot 6 \begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix} + (-1)^{3+3} \cdot$$

$$\cdot 0 \begin{vmatrix} 1 & 2 \\ 4 & 5 \end{vmatrix} = 3(4 \cdot 8 - 7 \cdot 5) - 6(1 \cdot 8 - 7 \cdot 2) =$$

$$= 3(32 - 35) - 6(8 - 14) = -9 + 36 = 27$$

№1.2.82.

$$\begin{vmatrix} x & y & z \\ 0 & y & z \\ x & 0 & z \end{vmatrix} = z\begin{vmatrix} 0 & y \\ x & 0 \end{vmatrix} - z\begin{vmatrix} x & y \\ x & 0 \end{vmatrix} + z\begin{vmatrix} x & y \\ 0 & y \end{vmatrix} =$$

$$= z(0 - xy) - z(x\cdot 0 - xy) + z(xy - 0\cdot y) =$$

$$= -\cancel{xyz} + \cancel{xyz} + xyz = xyz$$

№1.2.83

$$\begin{vmatrix} \cos\alpha & \cos\beta & \cos\gamma \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{vmatrix} = \cos\alpha\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} -$$

$$- \cos\beta\begin{vmatrix} 1 & 0 \\ 1 & 1 \end{vmatrix} + \cos\gamma\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix} =$$

$$= \cos\alpha(1\cdot 1 - 0\cdot 0) - \cos\beta(1\cdot 1 - 1\cdot 0) +$$

$$+ \cos\gamma(1\cdot 0 - 1\cdot 1) = \cos\alpha - \cos\beta - \cos\gamma$$

№1.2.84

$$\begin{vmatrix} -3 & 2 & 1 \\ x-1 & 0 & 7 \\ 2 & -1 & 3 \end{vmatrix} = 0$$

~~Решение по правилу треугольника~~

$$-2\begin{vmatrix} x-1 & 7 \\ 2 & 3 \end{vmatrix} - (-1)\begin{vmatrix} -3 & 1 \\ x-1 & 7 \end{vmatrix} = 0$$

$$-2\left((x-1)\cdot 3 - 2\cdot 7\right) + (-3)\cdot 7 - (x-1) = 0$$

$$-6x + 6 - 28 - 21 - x + 1 = 0$$

$$-7x - 42 = 0$$

$$x = \frac{42}{7}$$

$$x = 6$$

<u>W 1.2.85</u>

$$\begin{vmatrix} 2 & 0 & -1 \\ 1 & x+5 & 2-x \\ 3 & -1 & 2 \end{vmatrix} \leq 4$$

$$2\begin{vmatrix} x+5 & 2-x \\ -1 & 2 \end{vmatrix} + (-1)\begin{vmatrix} 1 & x+5 \\ 3 & -1 \end{vmatrix} \leq 4$$

$$2\left((x+5)\cdot 2 + (2-x)\right) - \left(1\cdot(-1) - 3(x+5)\right) \leq 4$$

$$4x + 20 - 2x + 1 + 3x + 15 - 4 \leq 0$$

$$5x + 36 \leq 0$$

$$5x \leq 36$$

$$x \leq 5{,}2$$

№1.2.86

$$\begin{vmatrix} x+2 & 4 & -1 \\ -2 & 2 & x-1 \\ 1 & 3 & 0 \end{vmatrix} = 0$$

$$-1\begin{vmatrix} -2 & 2 \\ 1 & 3 \end{vmatrix} - (x-1)\begin{vmatrix} x+2 & 4 \\ 1 & 3 \end{vmatrix} = 0$$

$$-(-2\cdot 3 - 1\cdot 2) - (x-1)((x+2)\cdot 3 - 1\cdot 4) = 0 \quad /\cdot(-1)$$

$$-6 - 2 + (x-1)(3x+6-4) = 0$$

$$-8 + 3x^2 - 3x + 2x - 2 = 0$$

$$3x^2 - x - 10 = 0$$

$$D = 1^2 - 4\cdot 3\cdot(-10) = 1 + 120 = 121$$

$$x_1 = \frac{1+11}{6} = 2$$

$$x_2 = \frac{1-11}{6} = -\frac{10}{6} = -1\frac{2}{3}$$

Ответ: $2; -1\frac{2}{3}$

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$$\begin{vmatrix} -3 & x-1 & 1 \\ x+2 & 2 & 3 \\ 0 & 1 & x \end{vmatrix} = 6$$

$$-1\begin{vmatrix} -3 & 1 \\ x+2 & 3 \end{vmatrix} + x\begin{vmatrix} -3 & x-1 \\ x+2 & 2 \end{vmatrix} = 6$$

$$-1\left(-3\cdot 3-(x+2)\right) + x\left(-3\cdot 2-(x+2)(x-1)\right) = 6$$

$$9+x+2-6x-x\left(x^2+2x-x-2\right) = 6$$

$$11-5x-x^3-x^2+2x-6 = 0$$

$$-x^3-x^2-3x+5 = 0$$

$$x^3+x^2+3x-5 = 0$$

$x = 1$ (подберем)

$$\begin{array}{l|l} x^3+x^2+3x-5 & x-1 \\ \hline -\,x^3-x^2 & x^2+2x+5 \\ \hline \quad 2x^2+3x-5 & \\ \quad -\,2x^2-2x & \\ \hline \qquad 5x-5 & \\ \qquad -\,5x-5 & \\ \hline \qquad\quad 0 & \end{array}$$

$x^2+2x+5=0$

$D=2^2-4\cdot5<0 \Rightarrow$ решений нет

Ответ: $x=1$

№1.2.88

$$\begin{vmatrix} 3 & 2 & -1 \\ x+2 & 0 & 1 \\ -2 & 3-x & 1 \end{vmatrix} < 0$$

по „правилу треугольника":

$2\cdot1\cdot(-2)+(x+2)(3-x)\cdot(-1)-(x+2)\cdot2\cdot1-$

$-(3-x)\cdot1\cdot3<0$

$-4-\cancel{3x}-6+x^2+\cancel{2x}-\cancel{2x}-4-9+\cancel{3x}<0$

$x^2-23<0$

$x^2<23$

$x<\pm\sqrt{23}$

№1.2.89

$$\det A=\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$ 1) det: $(a-b)$?

14 ~~Строка~~ Столбец 3 и 3 пропорционален столбцу 2 $\Rightarrow \det A=0 \Rightarrow$ 0: $(a-b)=0 \Rightarrow$

detA делится на $(a-b)$

2) $\det A \vdots (b-c)$?

detA делится на $(b-c)$, т.к. $\det A = 0$ (из предыдущего пункта)

3) $\det A \vdots (c-a)$?

detA делится на $(c-a)$, т.к. $\det A = 0$ (из п. 1)

№1.2.90

$$\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} = \det A$$

1) $\det A \vdots (a-b)$?

$$\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} \begin{matrix} \text{II} - \text{I} \\ \\ \\ \end{matrix} \sim \begin{vmatrix} 1 & a & bc \\ 0 & b-a & ca-bc \\ 1 & c & ab \end{vmatrix} =$$

$$= \begin{vmatrix} 1 & a & bc \\ 0 & -1(a-b) & c(a-b) \\ 1 & c & ab \end{vmatrix} = (a-b) \begin{vmatrix} 1 & a & bc \\ 0 & -1 & c \\ 1 & c & ab \end{vmatrix} \Rightarrow$$

$\Rightarrow$ detA делится на $a-b$

2) $\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} \vdots (b-c)$?

$$\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} \underline{II} - \underline{III} \sim \begin{vmatrix} 1 & a & bc \\ 0 & b-c & ca-ab \\ 1 & c & ab \end{vmatrix} =$$

$$= \begin{vmatrix} 1 & a & bc \\ 0 & (b-c) & b-c-a(b-c) \\ 1 & c & ab \end{vmatrix} = (b-c) \begin{vmatrix} 1 & a & bc \\ 0 & 1 & -a \\ 1 & c & ab \end{vmatrix} \Rightarrow$$

$\Rightarrow$ det A делится на $b-c$

3) $\det A \vdots (c-a)$?

$$\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} \underline{III} - \underline{I} \sim \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 0 & c-a & ab-bc \end{vmatrix} =$$

$$= \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 0 & (c-a) & c-a & -b(c-a) \end{vmatrix} =$$

$$= (c-a) \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 0 & 1 & -b \end{vmatrix} \Rightarrow$$ det A делится на $c-a$

"Определители"

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№ 1.2.91

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} \vdots (a-b), (b-c), (c-a) \ ?$$

Т.к. 2 строка и 3 строка пропорциональны, то $\det A = 0$. $\Rightarrow$ $\det A$ делится и на $a-b$, и на $b-c$, и на $c-a$.

№1.2.92

$$\begin{vmatrix} \sin\alpha & \cos\alpha & \sin(\alpha+\delta) \\ \sin\beta & \cos\beta & \sin(\beta+\delta) \\ \sin\gamma & \cos\gamma & \sin(\gamma+\delta) \end{vmatrix} =$$

$$= \cancel{\begin{vmatrix} \sin\alpha & \cos\alpha & \sin\alpha \\ \sin\beta & \cos\beta & \sin\beta \\ \sin\gamma & \cos\gamma & \sin\gamma \end{vmatrix}}^{=0} + \cancel{\begin{vmatrix} \sin\alpha & \cos\alpha & \sin\delta \\ \sin\beta & \cos\beta & \sin\delta \\ \sin\gamma & \cos\gamma & \sin\delta \end{vmatrix}} =$$

одинаковые

$$= \begin{vmatrix} \sin\alpha & \cos\alpha & \sin\delta \\ \sin\beta & \cos\beta & \sin\delta \\ \sin\gamma & \cos\gamma & \sin\delta \end{vmatrix}$$

$$= \begin{vmatrix} \sin\alpha & \cos\alpha & \sin\alpha\cos\delta + \sin\delta\cos\alpha \\ \sin\beta & \cos\beta & \sin\beta\cos\delta + \sin\delta\cos\beta \\ \sin\gamma & \cos\gamma & \sin\gamma\cos\delta + \sin\delta\cos\gamma \end{vmatrix} =$$

пропорциональны

$$= \begin{vmatrix} \sin\alpha & \cos\alpha & \sin\alpha\cos\delta \\ \sin\beta & \cos\beta & \sin\beta\cos\delta \\ \sin\gamma & \cos\gamma & \sin\gamma\cos\delta \end{vmatrix} +$$

$$+ \begin{vmatrix} \sin\alpha & \cos\alpha & \sin\delta\cos\alpha \\ \sin\beta & \cos\beta & \sin\delta\cos\beta \\ \sin\gamma & \cos\gamma & \sin\delta\cos\gamma \end{vmatrix} = 0$$

пропорциональны

№1.2.93

$$\begin{vmatrix} a & a^2+1 & (a+1)^2 \\ b & b^2+1 & (b+1)^2 \\ c & c^2+1 & (c+1)^2 \end{vmatrix} = \begin{vmatrix} a & a^2+1 & a^2+2a+1 \\ b & b^2+1 & b^2+2b+1 \\ c & c^2+1 & c^2+2c+1 \end{vmatrix} =$$

$$= \begin{vmatrix} a & a^2 & (a+1)^2 \\ b & b^2 & (b+1)^2 \\ c & c^2 & (c+1)^2 \end{vmatrix} = 0 + \begin{vmatrix} a & 1 & a^2+2a+1 \\ b & 1 & b^2+2b+1 \\ c & 1 & c^2+2c+1 \end{vmatrix} =$$

пропорциональны

пропорциональны пропорциональны одинаковые

$$= \begin{vmatrix} a & 1 & a^2 \\ b & 1 & b^2 \\ c & 1 & c^2 \end{vmatrix} = 0 + \begin{vmatrix} a & 1 & 2a \\ b & 1 & 2b \\ c & 1 & 2c \end{vmatrix} = 0 + \begin{vmatrix} a & 1 & 1 \\ b & 1 & 1 \\ c & 1 & 1 \end{vmatrix} = 0$$

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№1.2.94

$$\begin{vmatrix} x & a & b & 0 & c \\ 0 & y & 0 & 0 & d \\ 0 & e & z & 0 & f \\ 0 & 0 & 0 & 0 & u \\ g & h & k & u & l \end{vmatrix} = (-1)^{4+5} u \begin{vmatrix} x & a & b & 0 \\ 0 & y & 0 & 0 \\ 0 & e & z & 0 \\ g & h & k & u \end{vmatrix} = -u\left((-1)^{4+4} u \cdot \begin{vmatrix} x & a & b \\ 0 & y & 0 \\ 0 & e & z \end{vmatrix}\right) = -u\left(u\left((-1)^{2+2} y \begin{vmatrix} x & b \\ 0 & z \end{vmatrix}\right)\right) =$$

$$= -u(u(y(xz - 0b))) = -u \cdot u \cdot y \cdot xz =$$

$$= -u^2 yxz$$

№1.2.95

$$\begin{vmatrix} 0 & 5 & 2 & 0 \\ 8 & 3 & 5 & 4 \\ 7 & 2 & 4 & 1 \\ 0 & 4 & 1 & 0 \end{vmatrix} = (-1)^{1+2} \cdot 5 \begin{vmatrix} 8 & 5 & 4 \\ 7 & 4 & 1 \\ 0 & 1 & 0 \end{vmatrix} + (-1)^{1+3} \cdot 2 \begin{vmatrix} 8 & 3 & 4 \\ 7 & 2 & 1 \\ 0 & 4 & 0 \end{vmatrix} =$$

$$= -5\left((-1)^{3+2} \begin{vmatrix} 8 & 4 \\ 7 & 1 \end{vmatrix}\right) + 2\left((-1)^{3+2} \cdot 4 \begin{vmatrix} 8 & 4 \\ 7 & 1 \end{vmatrix}\right) =$$

$$= -5(-1(8 \cdot 1 - 7 \cdot 4)) + 2(-4(8 \cdot 1 - 7 \cdot 4)) =$$

$$= 40 - 140 - 64 + 224 = 60$$

№1.2.96

$$\begin{vmatrix} 5 & a & 2 & -1 \\ 4 & b & 4 & -3 \\ 2 & c & 3 & -2 \\ 4 & d & 5 & -4 \end{vmatrix} = a \cdot (-1)^{1+2} \begin{vmatrix} 4 & 4 & -3 \\ 2 & 3 & -2 \\ 4 & 5 & -4 \end{vmatrix} + b \cdot (-1)^{2+2} \begin{vmatrix} 5 & 2 & -1 \\ 2 & 3 & -2 \\ 4 & 5 & -4 \end{vmatrix} +$$

$$+c\cdot(-1)^{3+2}\begin{vmatrix}5 & 2 & -1\\ 4 & 4 & -3\\ 4 & 5 & -4\end{vmatrix}+d\cdot(-1)^{4+2}\begin{vmatrix}5 & 2 & -1\\ 4 & 4 & -3\\ 2 & 3 & -2\end{vmatrix}=$$

$$=-a\left(-3\cdot(-1)^{1+3}\begin{vmatrix}2 & 3\\ 4 & 5\end{vmatrix}-2\cdot(-1)^{2+3}\begin{vmatrix}4 & 4\\ 4 & 5\end{vmatrix}-4\cdot(-1)^{3+3}\begin{vmatrix}4 & 4\\ 2 & 3\end{vmatrix}\right)+$$

$$+b\left(-1\cdot(-1)^{1+3}\begin{vmatrix}2 & 3\\ 4 & 5\end{vmatrix}-2\cdot(-1)^{2+3}\begin{vmatrix}5 & 2\\ 4 & 5\end{vmatrix}-4\cdot(-1)^{3+3}\begin{vmatrix}5 & 2\\ 2 & 3\end{vmatrix}\right)-$$

$$-c\left(-1\cdot(-1)^{1+3}\begin{vmatrix}4 & 4\\ 4 & 5\end{vmatrix}-3\cdot(-1)^{2+3}\begin{vmatrix}5 & 2\\ 4 & 5\end{vmatrix}-4\cdot(-1)^{3+3}\begin{vmatrix}5 & 2\\ 4 & 4\end{vmatrix}\right)+$$

$$+d\left(-1\cdot(-1)^{1+3}\begin{vmatrix}4 & 4\\ 2 & 3\end{vmatrix}-3\cdot(-1)^{2+3}\begin{vmatrix}5 & 2\\ 2 & 3\end{vmatrix}-2\cdot(-1)^{3+3}\begin{vmatrix}5 & 2\\ 4 & 4\end{vmatrix}\right)=$$

$$=-a\left(-3\overset{-2}{(2\cdot5-4\cdot3)}+2\overset{4}{(4\cdot5-4\cdot4)}-4\overset{4}{(4\cdot3-2\cdot4)}\right)+$$

$$+b\left(-1\overset{-2}{(2\cdot5-4\cdot3)}+2\overset{17}{(5\cdot5-4\cdot2)}-4\overset{11}{(5\cdot3-2\cdot2)}\right)-$$

$$-c\left(-1\overset{4}{(4\cdot5-4\cdot4)}+3\overset{17}{(5\cdot5-4\cdot2)}-4\overset{12}{(5\cdot4-4\cdot2)}\right)+$$

$$+d\left(-1\overset{4}{(4\cdot3-2\cdot4)}+3\overset{11}{(5\cdot3-2\cdot2)}-2\overset{12}{(5\cdot4-4\cdot2)}\right)=$$

$$=-a\left(-6\overset{-14}{+8-16}\right)+b\left(2\overset{-8}{+34-44}\right)-$$

$$-c\left(-4\overset{-1}{+51-48}\right)+d\left(-4\overset{5}{+33-24}\right)=$$

$$=14a-8b+c+5d$$

„Определители"

Елкина Таня
ИВТ, 1к., 3 п/г

№1.2.97

$$\begin{vmatrix} 3 & 2 & 2 & 2 \\ 9 & -8 & 5 & 10 \\ 5 & -8 & 5 & 8 \\ 6 & -5 & 4 & 7 \end{vmatrix} = (-1)^{2+1}\cdot 9 \begin{vmatrix} 2 & 2 & 2 \\ -8 & 5 & 8 \\ -5 & 4 & 7 \end{vmatrix} + (-1)^{2+2}\cdot(-8) \begin{vmatrix} 3 & 2 & 2 \\ 5 & 5 & 8 \\ 6 & 4 & 7 \end{vmatrix} +$$

$$+ (-1)^{2+3}\cdot 5 \begin{vmatrix} 3 & 2 & 2 \\ 5 & -8 & 8 \\ 6 & -5 & 7 \end{vmatrix} + (-1)^{2+4}\cdot 10 \begin{vmatrix} 3 & 2 & 2 \\ 5 & -8 & 5 \\ 6 & -5 & 4 \end{vmatrix} =$$

$$= -9\left((-1)^{2+1}\cdot(-8)\begin{vmatrix} 2 & 2 \\ 4 & 7 \end{vmatrix} + (-1)^{2+2}\,5\begin{vmatrix} 2 & 2 \\ -5 & 7 \end{vmatrix} + (-1)^{2+3}\,8\begin{vmatrix} 2 & 2 \\ -5 & 4 \end{vmatrix}\right) -$$

$$-8\left((-1)^{2+1}\,5\begin{vmatrix} 2 & 2 \\ 4 & 7 \end{vmatrix} + (-1)^{2+2}\,5\begin{vmatrix} 3 & 2 \\ 6 & 7 \end{vmatrix} + (-1)^{2+3}\,8\begin{vmatrix} 3 & 2 \\ 6 & 4 \end{vmatrix}\right) -$$

$$-5\left((-1)^{2+1}\,5\begin{vmatrix} 2 & 2 \\ -5 & 7 \end{vmatrix} + (-1)^{2+2}(-8)\begin{vmatrix} 3 & 2 \\ 6 & 7 \end{vmatrix} + (-1)^{2+3}\,8\begin{vmatrix} 3 & 2 \\ 6 & -5 \end{vmatrix}\right) +$$

$$+10\left((-1)^{2+1}\,5\begin{vmatrix} 2 & 2 \\ -5 & 4 \end{vmatrix} + (-1)^{2+2}(-8)\begin{vmatrix} 3 & 2 \\ 6 & 4 \end{vmatrix} + (-1)^{2+3}\,5\begin{vmatrix} 3 & 2 \\ 6 & -5 \end{vmatrix}\right) =$$

$$= -9\left(8(\overset{6}{2\cdot 7-4\cdot 2}) + 5(\overset{24}{2\cdot 7+5\cdot 2}) - 8(\overset{18}{2\cdot 4+5\cdot 2})\right) -$$

$$-8\left(-5(\overset{6}{2\cdot 7-4\cdot 2}) + 5(\overset{9}{3\cdot 7-6\cdot 2}) - 8(\overset{0}{3\cdot 4-6\cdot 2})\right) -$$

$$-5\left(-5(\overset{24}{2\cdot 7+5\cdot 2}) - 8(\overset{-72}{3\cdot 7-6\cdot 2}) - 8(\overset{216}{3\cdot(-5)-6\cdot 2})\right) +$$

$$+10\left(-5(\overset{18}{2\cdot 4+5\cdot 2}) - 8(\overset{0}{3\cdot 4-6\cdot 2}) - 5(\overset{-27}{3\cdot(-5)-6\cdot 2})\right) =$$

$$= -9(48 + \overset{24}{120} - 144) - 8(-30 + \overset{45}{72} + \overset{45}{216}) -$$

$$-5(-120 - \overset{24}{72} + 216) + 10(-90 + 0 + 135) =$$

$$= -216 - 120 - 120 + 450 = -6$$

w 1.2.98

$$\begin{vmatrix} 7 & 3 & 2 & 6 \\ 8 & -9 & 4 & 9 \\ 7 & -2 & 7 & 3 \\ 5 & -3 & 3 & 4 \end{vmatrix} = (-1)^{1+2}\cdot 3 \begin{vmatrix} 8 & 4 & 9 \\ 7 & 7 & 3 \\ 5 & 3 & 4 \end{vmatrix} + (-1)^{2+2}\cdot(-9) \begin{vmatrix} 7 & 2 & 6 \\ 7 & 7 & 3 \\ 5 & 3 & 4 \end{vmatrix} +$$

$$+ (-1)^{3+2}\cdot(-2) \begin{vmatrix} 7 & 2 & 6 \\ 8 & 4 & 9 \\ 5 & 3 & 4 \end{vmatrix} + (-1)^{4+2}\cdot(-3) \begin{vmatrix} 7 & 2 & 6 \\ 8 & 4 & 9 \\ 7 & 7 & 3 \end{vmatrix} =$$

$$= -3\left((-1)^{1+1} 8 \begin{vmatrix} 7 & 3 \\ 3 & 4 \end{vmatrix} + (-1)^{1+2} 4 \begin{vmatrix} 7 & 3 \\ 5 & 4 \end{vmatrix} + (-1)^{1+3} 9 \begin{vmatrix} 7 & 7 \\ 5 & 3 \end{vmatrix}\right) -$$

$$-9\left((-1)^{1+1} 7 \begin{vmatrix} 7 & 3 \\ 3 & 4 \end{vmatrix} + (-1)^{1+2} 2 \begin{vmatrix} 7 & 3 \\ 5 & 4 \end{vmatrix} + (-1)^{1+3} 6 \begin{vmatrix} 7 & 7 \\ 5 & 3 \end{vmatrix}\right) +$$

$$+2\left((-1)^{1+1} 7 \begin{vmatrix} 4 & 9 \\ 3 & 4 \end{vmatrix} + (-1)^{1+2} 2 \begin{vmatrix} 8 & 9 \\ 5 & 4 \end{vmatrix} + (-1)^{1+3} 6 \begin{vmatrix} 8 & 4 \\ 5 & 3 \end{vmatrix}\right) -$$

$$-3\left((-1)^{1+1} 7 \begin{vmatrix} 4 & 9 \\ 7 & 3 \end{vmatrix} + (-1)^{1+2} 2 \begin{vmatrix} 8 & 9 \\ 7 & 3 \end{vmatrix} + (-1)^{1+3} 6 \begin{vmatrix} 8 & 4 \\ 7 & 7 \end{vmatrix}\right) =$$

$$= -3(8\cdot 19 - 4\cdot \overset{-26}{13} + 9\cdot(-14)) - 9(7\cdot 19 - 2\cdot \overset{23}{13} + 6\cdot(-14)) +$$

$$+2(7\cdot(-47) - 2\cdot \overset{-279}{(-13)} + 6\cdot 48) - 3(7\cdot(-51) - 2\cdot \overset{-117}{(-39)} +$$

$$+6\cdot 28) = 78 - 207 - 558 + 333 = -354$$

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$$\begin{vmatrix} 3 & 6 & 5 & 6 & 4 \\ 5 & 9 & 7 & 8 & 6 \\ 6 & 12 & 13 & 9 & 7 \\ 4 & 6 & 6 & 5 & 4 \\ 2 & 5 & 4 & 5 & 3 \end{vmatrix} \leftarrow (=) (-1)^{3+1} 6 \begin{vmatrix} 6 & 5 & 6 & 4 \\ 9 & 7 & 8 & 6 \\ 6 & 6 & 5 & 4 \\ 5 & 4 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{3+2} 12 \begin{vmatrix} 3 & 5 & 6 & 4 \\ 5 & 7 & 8 & 6 \\ 4 & 6 & 5 & 4 \\ 2 & 4 & 5 & 3 \end{vmatrix} \leftarrow +$$

$$+ (-1)^{3+3} 13 \begin{vmatrix} 3 & 6 & 6 & 4 \\ 5 & 9 & 8 & 6 \\ 4 & 6 & 5 & 4 \\ 2 & 5 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{3+4} 9 \begin{vmatrix} 3 & 6 & 5 & 4 \\ 5 & 9 & 7 & 6 \\ 4 & 6 & 6 & 4 \\ 2 & 5 & 4 & 3 \end{vmatrix} \leftarrow + (-1)^{3+5} 7 \begin{vmatrix} 3 & 6 & 5 & 6 \\ 5 & 9 & 7 & 8 \\ 4 & 6 & 6 & 5 \\ 2 & 5 & 4 & 5 \end{vmatrix} \leftarrow (=)$$

$$(=) 6 \left((-1)^{2+1} 9 \begin{vmatrix} 5 & 6 & 4 \\ 6 & 5 & 4 \\ 4 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+2} 7 \begin{vmatrix} 6 & 6 & 4 \\ 6 & 5 & 4 \\ 5 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+3} 8 \begin{vmatrix} 6 & 5 & 4 \\ 6 & 6 & 4 \\ 5 & 4 & 3 \end{vmatrix} \leftarrow + (-1)^{2+4} 6 \begin{vmatrix} 6 & 5 & 6 \\ 6 & 6 & 5 \\ 5 & 4 & 5 \end{vmatrix} \leftarrow \right) -$$

$$-12 \left((-1)^{2+1} 5 \begin{vmatrix} 5 & 6 & 4 \\ 6 & 5 & 4 \\ 4 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+2} 7 \begin{vmatrix} 3 & 6 & 4 \\ 4 & 5 & 4 \\ 2 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+3} 8 \begin{vmatrix} 3 & 5 & 4 \\ 4 & 6 & 4 \\ 2 & 4 & 3 \end{vmatrix} \leftarrow + (-1)^{2+4} 6 \begin{vmatrix} 3 & 5 & 6 \\ 4 & 6 & 5 \\ 2 & 4 & 5 \end{vmatrix} \leftarrow \right) +$$

$$+13 \left((-1)^{2+1} 5 \begin{vmatrix} 6 & 6 & 4 \\ 6 & 5 & 4 \\ 5 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+2} 9 \begin{vmatrix} 3 & 6 & 4 \\ 4 & 5 & 4 \\ 2 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+3} 8 \begin{vmatrix} 3 & 6 & 4 \\ 4 & 6 & 4 \\ 2 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+4} 6 \begin{vmatrix} 3 & 6 & 6 \\ 4 & 6 & 5 \\ 2 & 5 & 5 \end{vmatrix} \leftarrow \right) -$$

$$-9 \left((-1)^{2+1} 5 \begin{vmatrix} 6 & 5 & 4 \\ 6 & 6 & 4 \\ 5 & 4 & 3 \end{vmatrix} \leftarrow + (-1)^{2+2} 9 \begin{vmatrix} 3 & 5 & 4 \\ 4 & 6 & 4 \\ 2 & 4 & 3 \end{vmatrix} \leftarrow + (-1)^{2+3} 7 \begin{vmatrix} 3 & 6 & 4 \\ 4 & 6 & 4 \\ 2 & 5 & 3 \end{vmatrix} \leftarrow + (-1)^{2+4} 6 \begin{vmatrix} 3 & 6 & 5 \\ 4 & 6 & 6 \\ 2 & 5 & 4 \end{vmatrix} \leftarrow \right) +$$

$$+7 \left((-1)^{2+1} 5 \begin{vmatrix} 6 & 5 & 6 \\ 6 & 6 & 5 \\ 5 & 4 & 5 \end{vmatrix} \leftarrow + (-1)^{2+2} 9 \begin{vmatrix} 3 & 5 & 6 \\ 4 & 6 & 5 \\ 2 & 4 & 5 \end{vmatrix} \leftarrow + (-1)^{2+3} 7 \begin{vmatrix} 3 & 6 & 6 \\ 4 & 6 & 5 \\ 2 & 5 & 5 \end{vmatrix} \leftarrow + (-1)^{2+4} 8 \begin{vmatrix} 3 & 6 & 5 \\ 4 & 6 & 6 \\ 2 & 5 & 4 \end{vmatrix} \leftarrow \right) (=)$$

$$(=) 6 \left(-9 \left((-1)^{1+1} 5 \begin{vmatrix} 5 & 4 \\ 5 & 3 \end{vmatrix} + (-1)^{1+2} 6 \begin{vmatrix} 6 & 4 \\ 4 & 3 \end{vmatrix} + (-1)^{1+3} 4 \begin{vmatrix} 6 & 5 \\ 4 & 5 \end{vmatrix} \right) + \right.$$

$$\left. +7 \left((-1)^{1+1} 6 \begin{vmatrix} 5 & 4 \\ 5 & 3 \end{vmatrix} + (-1)^{1+2} 6 \begin{vmatrix} 6 & 4 \\ 5 & 3 \end{vmatrix} + (-1)^{1+3} 4 \begin{vmatrix} 6 & 5 \\ 5 & 5 \end{vmatrix} \right) - \right.$$

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$$-8\left((-1)^{1+1}6\begin{vmatrix}6&4\\4&3\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}6&4\\5&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}6&6\\5&4\end{vmatrix}\right)+$$

$$+6\left((-1)^{1+1}6\begin{vmatrix}6&5\\4&5\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}6&5\\5&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}6&6\\5&4\end{vmatrix}\right)\Bigg)-$$

$$-12\Bigg(-5\left((-1)^{1+1}5\begin{vmatrix}5&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}6&4\\4&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}6&5\\4&3\end{vmatrix}\right)+$$

$$+7\left((-1)^{1+1}3\begin{vmatrix}5&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&5\\2&5\end{vmatrix}\right)-$$

$$-8\left((-1)^{1+1}3\begin{vmatrix}6&4\\4&3\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&6\\2&4\end{vmatrix}\right)+$$

$$+6\left((-1)^{1+1}3\begin{vmatrix}6&5\\4&5\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}4&5\\2&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}4&6\\2&4\end{vmatrix}\right)\Bigg)+$$

$$+13\Bigg(-5\left((-1)^{1+1}6\begin{vmatrix}5&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}6&4\\5&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}6&5\\5&5\end{vmatrix}\right)+$$

$$+9\left((-1)^{1+1}3\begin{vmatrix}5&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&5\\2&5\end{vmatrix}\right)-$$

$$-8\left((-1)^{1+1}3\begin{vmatrix}6&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)+$$

$$+6\left((-1)^{1+1}3\begin{vmatrix}6&5\\5&5\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&5\\2&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)\Bigg)-$$

$$-9\Bigg(-5\left((-1)^{1+1}6\begin{vmatrix}6&4\\4&3\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}6&4\\5&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}6&6\\5&4\end{vmatrix}\right)+$$

$$+9\left((-1)^{1+1}3\begin{vmatrix}6&4\\4&3\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&6\\2&4\end{vmatrix}\right)-$$

$$-7\left((-1)^{1+1}3\begin{vmatrix}6&4\\5&3\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&4\\2&3\end{vmatrix}+(-1)^{1+3}4\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)+$$

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$$+6\left((-1)^{1+1}3\begin{vmatrix}6&6\\5&4\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&6\\2&4\end{vmatrix}+(-1)^{1+3}5\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)+$$

$$+7\left(-5\left((-1)^{1+1}6\begin{vmatrix}6&5\\4&5\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}6&5\\5&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}6&6\\5&4\end{vmatrix}\right)+\right.$$

$$+9\left((-1)^{1+1}3\begin{vmatrix}6&5\\4&5\end{vmatrix}+(-1)^{1+2}5\begin{vmatrix}4&5\\2&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}4&6\\2&4\end{vmatrix}\right)-$$

$$-7\left((-1)^{1+1}3\begin{vmatrix}6&5\\5&5\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&5\\2&5\end{vmatrix}+(-1)^{1+3}6\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)+$$

$$+8\left((-1)^{1+1}3\begin{vmatrix}6&6\\5&4\end{vmatrix}+(-1)^{1+2}6\begin{vmatrix}4&6\\2&4\end{vmatrix}+(-1)^{1+3}5\begin{vmatrix}4&6\\2&5\end{vmatrix}\right)\Bigg) \quad 2$$

$$2 \quad 6\left(-9\left(5\cdot(-5)-\overset{3}{6}\cdot 2+4\cdot 10\right)+7\left(6\cdot(-5)-\overset{1}{6}\cdot(-2)+4\cdot 5\right)-\right.$$

$$-8\left(6\cdot 2-5\cdot\overset{-2}{(-2)}+4\cdot(-6)\right)+6\left(6\cdot 10-5\cdot 5+6\cdot(-6)\right)\Big)-$$

$$-12\left(-5\left(5\cdot(-5)-\overset{-45}{6}\cdot 2+4\cdot(-2)\right)+7\left(3\cdot(-5)-\overset{1}{6}\cdot 4+4\cdot 10\right)-\right.$$

$$-8\left(3\cdot 2-5\cdot\overset{2}{4}+4\cdot 4\right)+6\left(3\cdot 10-5\cdot\overset{4}{10}+6\cdot 4\right)\Big)+$$

$$+13\left(-5\left(6\cdot(-5)-\overset{2}{6}\cdot(-2)+4\cdot 5\right)+9\left(3\cdot(-5)-\overset{1}{6}\cdot 4+4\cdot 10\right)-\right.$$

$$-8\left(3\cdot(-2)-\overset{2}{6}\cdot 4+4\cdot 8\right)+6\left(3\cdot 5-6\cdot\overset{3}{10}+6\cdot 8\right)\Big)-$$

$$-9\left(-5\left(6\cdot 2-5\cdot\overset{-2}{(-2)}+4\cdot(-6)\right)+9\left(3\cdot 2-5\cdot\overset{2}{4}+4\cdot 4\right)-\right.$$

$$-7\left(3\cdot(-2)-6\cdot\overset{18}{4}+4\cdot 8\right)+6\left(3\cdot(-6)-6\cdot\overset{-2}{4}+5\cdot 8\right)\Big)+$$

$$+7\left(-5\left(6\cdot 10-5\cdot\overset{-31}{5}+6\cdot(-6)\right)+9\left(3\cdot 10-5\cdot\overset{4}{10}+6\cdot 4\right)-\right.$$

$$-7\left(3\cdot 5-6\cdot\overset{3}{10}+6\cdot 8\right)+8\left(3\cdot(-6)-6\cdot\overset{-2}{4}+5\cdot 8\right)\Big) \quad 2$$

$$2 \quad 6\left(-9\cdot 3+7\cdot 2-\overset{-1}{8}\cdot(-2)+6\cdot(-1)\right)-12\left(-5\cdot(-45)+\overset{240}{7}\cdot 1-\right.$$

$$-8\cdot 2+6\cdot 4\Big)+13\left(-5\cdot 2+9\cdot 1-\overset{1}{8}\cdot 2+6\cdot 3\right)- \quad 25$$

$-9(-5\cdot(-2)+9\cdot 2-7\cdot 18+6\cdot(-2))+7(-5\cdot(-31)+$

$+9\cdot 4-7\cdot 3+8\cdot(-2))=6\cdot(-1)-12\cdot 240+13\cdot 1-$

$-9\cdot(-110)+7\cdot 154=-6-2880+13+990+1078=$

$=-805.$

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