

15. If A is a 4×4 ~~matrix~~ matrix, then

$$\det A = \sum (-1)^p a_{1i_1} a_{2i_2} a_{3i_3} a_{4i_4}$$

where $p=1$ if (i_1, i_2, i_3, i_4) is an odd permutation of $\{1, 2, 3, 4\}$ and $p=2$ otherwise. There are 24 terms in this sum

$$16. \begin{vmatrix} 4 & -9 & 9 & 2 \\ -2 & 5 & 6 & 4 \\ 1 & 2 & -5 & -3 \\ 1 & -2 & 0 & -2 \end{vmatrix}$$

using problems 14 and 15 we know we need to evaluate products for all possible combinations of picking one element from each row.

$$+(4 \cdot 5 \cdot (-5) \cdot (-2)) - 4 \cdot 5 \cdot (-3) \cdot (0) - 4 \cdot 6 \cdot 2 \cdot (-2)$$

$(1, 2, 3, 4) \qquad (1, 2, 4, 3) \qquad (1, 3, 2, 4)$

$$+(4 \cdot 6 \cdot (-3) \cdot (-2)) + \dots + (2 \cdot 6 \cdot 2 \cdot 1)$$

$(1, 3, 4, 2) \qquad (4, 3, 2, 1)$

$$= 275$$