Step-1

Given that

Rule (2): The determinant changes sign when two rows are exchanged.

Rule (3): The determinant depends linearly on the first row.

Rule (6): If A has a row of zeros, then $\det(A) = 0$

We have to show that how rule (6) comes directly from rules 2 and 3.

Step-2

Suppose a square matrix has a row of zeros, say the k^{th} row R_k consist of all zeros. It looks as below:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & \cdots & 0 \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

Step-3

Then by rule 3, $t|A| = |B|$ where B is obtained by multiplying a sample row in A,

Now

$$2|A| = |A| (\text{multiplying kth row by } 2A \text{ is unaltered})$$

$$\Rightarrow 2|A| - |A| = 0$$
$$\Rightarrow |A| = 0$$

Therefore rule (6) comes directly from rules 2 and 3.