Explanation for 7.2 Notes: Determinants of 3x3

If you just want a formula to memorize for the determinant of

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

then that is simply: $det\,[A] = |A| = a(ei - fh) - b(di - fg) + c(dh - eg)$.

If you want to know what we're doing with that formula, keep reading.

For anything larger than a 2x2 you must break the determinant down into a series of smaller 2x2 determinantes. You must also alternate signs between the smaller 2x2 determinants starting with a positive sign.

Step 1: Starting off with *a*, ignore everything in the first row and first column and multiply *a* by the determinant of what is left over. In other words:

$$a \bullet \det\begin{bmatrix} e & f \\ h & i \end{bmatrix}$$

Step 2: Move on to *b*, ignore everything in the second row and second column and multiply *b* by the determinant of what is left over. Subtract this from what you got in step 1. In other words:

$$-\,b \bullet \det\begin{bmatrix} d & f \\ g & i \end{bmatrix}$$

Step 3: Lastly working with *c*, ignore everything in the third row and third column and multiply *c* by the determinant of what is left over. Add this to what you got in step 2. In other words:

$$+\,c \bullet \det\begin{bmatrix} d & e \\ g & h \end{bmatrix}$$

If you ever run into taking the determinant of a 4x4, the method above still holds and step 4 would involve subtracingt. The issue would be having to take the determinants of 3x3 matrices, where you would have to start over and break them down into various 2x2 determinants.

If you'd rather watch a video about it: https://www.youtube.com/watch?v=eYjSu_xXUUQ.