Extra answers (not included in textbook or solutions manual) for Chapter 2.3

**3.** The third row equals the first row plus the second row, so you can introduce a row of zeros using elementary row operations.

**9.** Add $-1$ times the first column to the second column, "factor out" the $-2$ from the second column, and then add $-1$ times the second column to the first column.

$$\begin{vmatrix} a_1+b_1 & a_1-b_1 & c_1 \\ a_2+b_2 & a_2-b_2 & c_2 \\ a_3+b_3 & a_3-b_3 & c_3 \end{vmatrix} = \begin{vmatrix} a_1+b_1 & -2b_1 & c_1 \\ a_2+b_2 & -2b_2 & c_2 \\ a_3+b_3 & -2b_3 & c_3 \end{vmatrix} = -2\begin{vmatrix} a_1+b_1 & b_1 & c_1 \\ a_2+b_2 & b_2 & c_2 \\ a_3+b_3 & b_3 & c_3 \end{vmatrix} = -2\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$$

**10.** Add $-t$ times the first column to the second column, then add $-s$ times the first column and $-r$ times the second column to the third column. (Note that none of these column operations change the value of the determinant.)