1.14 For every i, j, if $w_{ij} = w_{ij}^S + w_{ij}^A$, then $w_{ji} = w_{ij}^S - w_{ij}^A$.

This is feasible since we have 2 variables for 2 equations.

$$2\sum_{i=1}^{D}\sum_{j=1}^{D} w_{ij}x_ix_j = \sum_{i=1}^{D}\sum_{j=1}^{D} w_{ij}x_ix_j + \sum_{i=1}^{D}\sum_{j=1}^{D} w_{ji}x_jx_i$$

$$= \sum_{i=1}^{D}\sum_{j=1}^{D}(w_{ij}^S + w_{ij}^A)x_ix_j + \sum_{i=1}^{D}\sum_{j=1}^{D}(w_{ij}^S - w_{ij}^A)x_jx_i$$

$$= \sum_{i=1}^{D}\sum_{j=1}^{D}((w_{ij}^S + w_{ij}^A)x_ix_j + (w_{ij}^S - w_{ij}^A)x_jx_i)$$

$$= \sum_{i=1}^{D}\sum_{j=1}^{D} 2w_{ij}^S x_ix_j$$

$$\implies 2\sum_{i=1}^{D}\sum_{j=1}^{D} w_{ij}x_ix_j = \sum_{i=1}^{D}\sum_{j=1}^{D} 2w_{ij}^S x_ix_j$$

$$\implies \sum_{i=1}^{D}\sum_{j=1}^{D} w_{ij}x_ix_j = \sum_{i=1}^{D}\sum_{j=1}^{D} w_{ij}^S x_ix_j$$

The number of independent parameters in the matrix w_{ij}^S is given by the sum of the number of elements above (or below, either works) the diagonal, given by $\left(\frac{1}{2}(D^2 - D)\right)$, plus the number of elements in the diagonal, given by D.

$$= \frac{1}{2}(D^2 - D) + D$$

$$= \frac{D^2}{2} - \frac{D}{2} + D$$

$$= \frac{D^2}{2} + \frac{D}{2}$$

$$= \frac{D(D+1)}{2}$$