Example 4.7. For the same party as Example 4.6 how many ways are there to assign guests to seats in such a way that every guy is sitting next to at least one gal, and *vice versa*.

Solution:

(1) *Assign guests to tables as in Example 4.6*

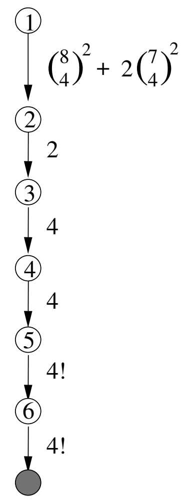
(2) *Pick a table*

(3) *Pick gender arrangement for one side from* {MFMF, MFFM, FMFM, FMMF}

(4) *Pick gender arrangement for the other side from* {MFMF, MFFM, FMFM, FMMF}

(5) *Assign 4 guys to 4 seats*

(6) *Assign 4 gals to 4 seats*



Thus, for each assignment of guests to tables, there are $2 \cdot 4 \cdot 4 \cdot 4! \cdot 4! = 18,432$ different ways to assign guest to seats in such a way that each guy is sitting next to at least one gal and *vice versa*. The final count becomes

$$18432 \cdot \left[\binom{8}{4}^2 + 2\binom{7}{4}^2 \right]$$