

- Step 2: Empty Matrix  $A$ : square  
Dimension is the number of animals in pedigree

$$A_{6 \times 6} = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{matrix} & \left[ \begin{array}{cccccc} 1 & 0 & 1/2 & 1/2 & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \end{array} \right] \end{matrix}$$

$(A)_{11}$  (pointing to 1),  $(A)_{12}$  (pointing to 0),  $(A)_{13}$  (pointing to 1/2)

- Step 3: Diagonal element  $(A)_{11} = 1 + F_1 = 1$   
Because animal 1 has unknown parents  $F_1 = 0$

- Step 4: Off-diagonal:

$$(A)_{12} = \frac{1}{2} \left[ \underbrace{(A)_{1,NA}}_{=0} + \underbrace{(A)_{1,NA}}_{=0} \right] = 0$$

$$\begin{aligned} (A)_{13} &= \frac{1}{2} \left[ (A)_{1,1} + (A)_{1,2} \right] \\ &= \frac{1}{2} [1 + 0] = \frac{1}{2} \end{aligned}$$

$$(A)_{14} = \frac{1}{2} \left[ (A)_{1,1} + (A)_{1,NA} \right] = \frac{1}{2}$$

- Step 5: Copy first row into first column