To get to L and D, we are going to have a look at different decompositions of breeding values:

- breeding value u_i of animal i can be written as

$$u_i = \frac{1}{2} u_s + \frac{1}{2} u_d + m_i$$

where u_s is the breeding value of parents
u_d is the breeding value of parental
m_i is the mendelian sampling term of animal i.

⇒ for example pedigree:

$$u_1 = 0 + 0 + m_1$$
$$u_2 = \frac{1}{2} u_{M1} + \frac{1}{2} u_{M2} + m_2 = m_2$$
$$u_3 = m_3$$
$$u_4 = \frac{1}{2} u_1 + \frac{1}{2} u_2 + m_4$$
$$u_5 = \frac{1}{2} u_{33} + \frac{1}{2} u_2 + m_5$$

set of equations

write equations in matrix vector notation

$$\begin{bmatrix} u_1 \\ \vdots \end{bmatrix} \quad \begin{bmatrix} m \end{bmatrix}$$