

1 Let

$$L = \begin{bmatrix} 1 & 3 \\ 0.7 & 0 \end{bmatrix}$$

be the Leslie matrix for a population with two age groups.

- Determine both eigenvalues.
- Give a biological interpretation of the largest of the two eigenvalues.
- Find the stable age distribution.

2 Let $\mathbf{x} = \begin{bmatrix} -4 \\ 3 \\ 1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 0 \\ -2 \\ 3 \end{bmatrix}$.

- Find $\mathbf{x} - \mathbf{y}$.
- Find $2\mathbf{x} + 3\mathbf{y}$.
- Find $-\mathbf{x} - 2\mathbf{y}$.
- Find the length of \mathbf{x} .

3 Let $A = (-1, 0)$ and $B = (2, -4)$. Find the vector representation of $B - A$ (same as \overrightarrow{AB}). Then sketch A, B and $B - A$.

4 Find the dot product of $\mathbf{x} = \begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 3 \\ 1 \\ -2 \end{bmatrix}$.

5 Let $\mathbf{x} = \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix}$. Find a \mathbf{y} such that \mathbf{x} and \mathbf{y} are perpendicular.

6 A triangle has vertices at coordinates $P = (0, 0), Q = (0, 3)$ and $R = (5, 0)$.

- Find the lengths of all three sides.
- Use the dot product to find all three angles.

- 7 Find a representation of the line through the two points $(2, 1)$ and $(1, 0)$.