6.5 Further exercise 2

a.

$$\begin{bmatrix} J_{t+1} \\ A_{t+1} \end{bmatrix} = \begin{bmatrix} 0.4 & 4 \\ 0.5 & 0.75 \end{bmatrix} \begin{bmatrix} J_t \\ A_t \end{bmatrix}$$

b.

$$\begin{pmatrix} 0.4 & 4 \\ 0.5 & 0.75 \end{pmatrix} \begin{pmatrix} 50 \\ 35 \end{pmatrix} = \begin{pmatrix} 160 \\ 51.25 \end{pmatrix}$$

Next year's population will be 160 juveniles and 51.25 adults.

c.

$$\lambda^2 - 1.15\lambda - 1.7 = 0$$

$$\lambda = \frac{1.15 \pm \sqrt{1.3225 + 6.8}}{2}$$

$$\lambda = 2 \qquad \lambda = -0.85$$

$$\begin{bmatrix} 0.4 & 4 \\ 0.5 & 0.75 \end{bmatrix} \begin{bmatrix} X \\ Y \end{bmatrix} = 2 \begin{bmatrix} X \\ Y \end{bmatrix}$$

$$0.4X + 4Y = 2X \qquad 0.5X + 0.75Y = 2Y$$

$$4Y = 1.6X \qquad 1.25Y = 0.5X$$

$$Y = 0.4X \qquad Y = 0.4X$$

Long-term ratio between juveniles & adults:

$$\begin{bmatrix} 1 \\ 0.4 \end{bmatrix} = 2.5 \text{ juveniles to adults}$$

In the long run the blobfish population exponentially increases by 200%. along the blobfish juvenile and adult population per year.