Live Script on Spotted Owl Population:

1. First we create the stage matrix A as provided:

```
A = [0, 0, 0.33;0.18, 0, 0;0, 0.71, 0.94]
```

```
A = 3×3
          0            0   3.3000e-01
 1.8000e-01            0            0
          0   7.1000e-01   9.4000e-01
```

next we calculate the eigenvectors and corresponding eigenvalues:

```
[eigenvectors, eigenvalues] = eig(A)
```

```
eigenvectors = 3×3 complex
  6.8209e-01 + 0.0000e+00i   6.8209e-01 + 0.0000e+00i   3.1754e-01 + 0.0000e+00i
 -6.2412e-02 - 5.8963e-01i  -6.2412e-02 + 5.8963e-01i   5.8111e-02 + 0.0000e+00i
 -4.5052e-02 + 4.2562e-01i  -4.5052e-02 - 4.2562e-01i   9.4646e-01 + 0.0000e+00i
eigenvalues = 3×3 complex
 -2.1796e-02 + 2.0592e-01i   0.0000e+00 + 0.0000e+00i   0.0000e+00 + 0.0000e+00i
  0.0000e+00 + 0.0000e+00i  -2.1796e-02 - 2.0592e-01i   0.0000e+00 + 0.0000e+00i
  0.0000e+00 + 0.0000e+00i   0.0000e+00 + 0.0000e+00i   9.8359e-01 + 0.0000e+00i
```

From that we can put the values into an eigenvalues matrix using diagonal:

```
lambda = diag(eigenvalues)
```

```
lambda = 3×1 complex
 -2.1796e-02 + 2.0592e-01i
 -2.1796e-02 - 2.0592e-01i
  9.8359e-01 + 0.0000e+00i
```

```
magnitudes = abs(lambda)
```

```
magnitudes = 3×1
  2.0707e-01
  2.0707e-01
  9.8359e-01
```

Analysis of Population Dynamics: By the definition of eigenvalues, we know in the context they indicate the future trend of the population of spotted owls. Here, all eigenvalues have magnitudes less than 1, indicating that the population will approach zero over time.

2. For the second part of the problem, we know from mini-project that the critical survival rate is 0.26, therefore we replace 18% with 26%. After

this, we obtain eigenvalues by:

```
B = [0, 0, 0.33;0.26, 0, 0;0, 0.71, 0.94]
```

```
B = 3×3
            0            0   3.3000e-01
   2.6000e-01            0            0
            0   7.1000e-01   9.4000e-01
```

```
eigenvalues = eig(B)
```

```
eigenvalues = 3×1 complex
  -3.0409e-02 + 2.4483e-01i
  -3.0409e-02 - 2.4483e-01i
   1.0008e+00 + 0.0000e+00i
```

from the output we can see that the largest dominant eigenvalue is close to 1, which indicates stablility in own population in the expected future.