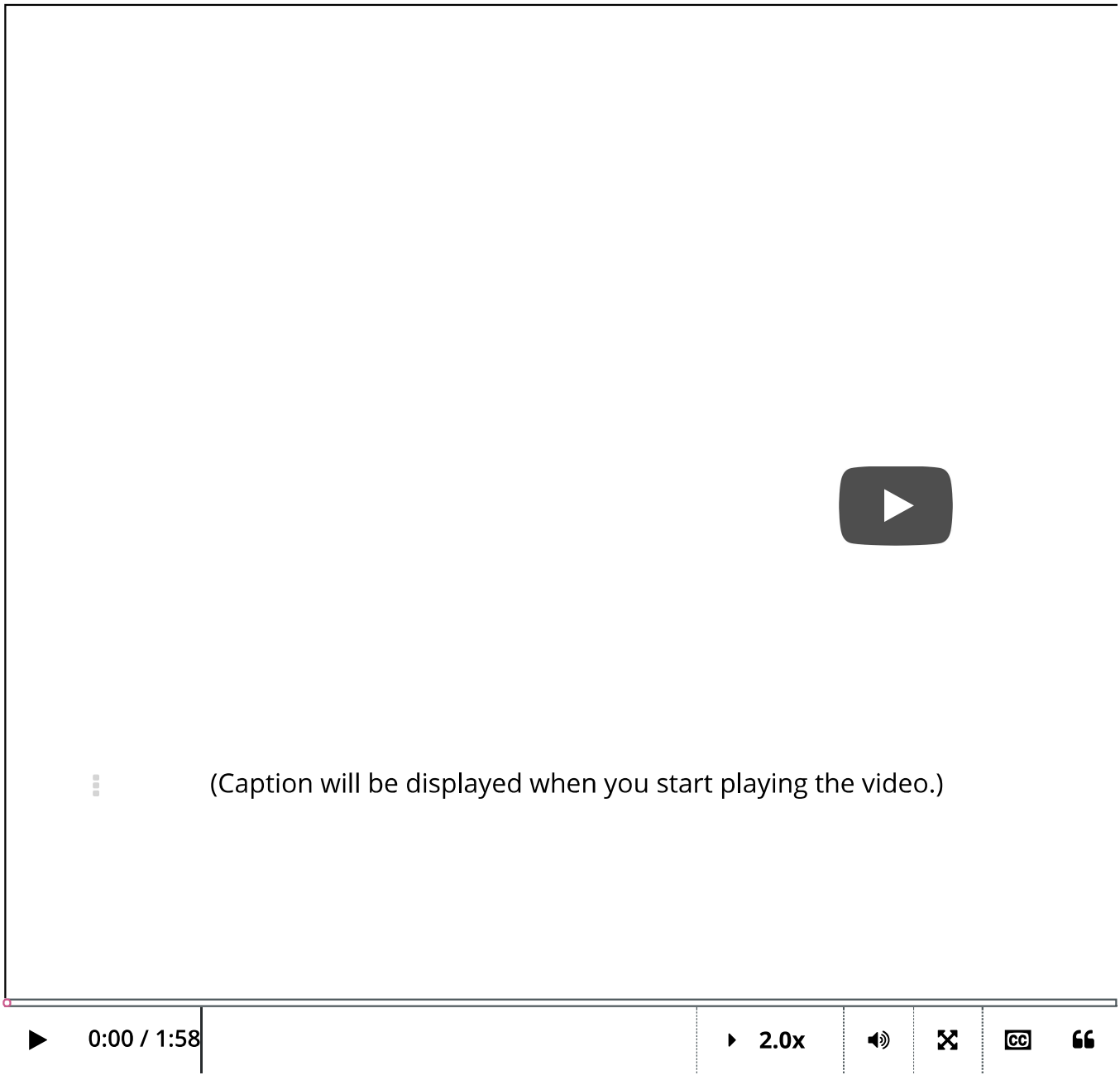
2. Eigenvalues and eigenvectors in MATLAB
Finding eigenvalues and eigenvectors in MATLAB



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Finding eigenvalues and eigenvectors using MATLAB

If $\mathbf{A}$ is a square matrix, then we write the following command in MATLAB

```
[V,D] = eig(A)
```

This generates two square matrices:

1. $\mathbf{V}$ is a 3x3 matrix, where each column is a nonzero eigenvector of $\mathbf{A}$.

2. $\mathbf{D}$ is a diagonal 3x3 matrix. The elements along the diagonal are the eigenvalues of the matrix $\mathbf{A}$.

Write a MATLAB script which calculates the three eigenvectors $\mathbf{v1}, \mathbf{v2}, \mathbf{v3}$ of the matrix $\mathbf{A}$, and the corresponding eigenvalues $\mathbf{e1}, \mathbf{e2}, \mathbf{e3}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 5 & 1 \\ 1 & 0 & 3 \end{bmatrix}.$$

Your Script

Save Reset MATLAB Documentation (https://www.mathworks.com/help/)

```
% Matrix A is provided for you.
A = [1 -1 0; 2 5 1; 1 0 3];
% Now use eig(A) to find the eigenvalues and eigenvectors of A
[V, D] = eig(A)
% Now extract the three eigenvectors of A
% and define them as three separate column vectors v1, v2, v3
v1 = V(:,1);
v2 = V(:,2);
v3 = V(:,3);
% Now extract the three correspondong eigenvalues of A
% and define them as three separate variables e1, e2, e3.
% These should be numbered so that A*v1 = e1*v1, etc.
e1 = D(1,1);
e2 = D(2,2);
e3 = D(3,3);
```

▶ Run Script ()

Assessment: Correct

Submit ()

- Eig used
- Check v1, v2, and v3 exist, are nonzero, and are distinct
- Check eigenvectors and eigenvalues correctly defined

Output

```
V =

   -0.8090   -0.3015    0.3090
    0.3090    0.9045   -0.8090
    0.5000   -0.3015    0.5000


D =
```

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