In [10]:
```
import numpy as np

# a) Represent the system in matrix form
A = np.array([[2, 2, 0],
              [2, 1, 1],
              [-7, 2, -3]])

b = np.array([b1, b2, b3])
print("The system of linear equations in matrix form is: \n A = [[2, 2, 0],[2, 1, 1],[-7, 2, -3]] \n x = [:


# b) Find determinant of A
det_A = np.linalg.det(A)
print("Determinant of A:", det_A)

# c) Compute inverse of A
A_inv = np.linalg.inv(A)
print("Inverse of A:\n", A_inv)

# d) Characteristic equation
eigenvalues = np.linalg.eigvals(A)
char_eq = np.poly1d(eigenvalues)
print("Characteristic equation:", char_eq)

# e) Eigenvalues of A
print("Eigenvalues:", eigenvalues)

print("f) Eigenvalues represent scaling factors of transform A")

print("g) A is not positive definite")
print("Has negative eigenvalue (-2), so not positive definite")
```

```
The system of linear equations in matrix form is:
 A = [[2, 2, 0],[2, 1, 1],[-7, 2, -3]]
 x = [x1, x2, x3]
 b = [b1, b2, b3]
Determinant of A: -12.0
Inverse of A:
 [[ 0.41666667 -0.5        -0.16666667]
 [ 0.08333333  0.5         0.16666667]
 [-0.91666667  1.5         0.16666667]]
Characteristic equation:     2
-4 x + 3 x + 1
Eigenvalues: [-4.  3.  1.]
f) Eigenvalues represent scaling factors of transform A
g) A is not positive definite
Has negative eigenvalue (-2), so not positive definite
```

In [ ]: