Exercise Inverse Iteration

1. Define a matrix A

$$A = \begin{bmatrix} 0 & 1 \\ -1.01 & -0.2 \end{bmatrix}$$

And compute the eigenvalues eig(A)

What happens with the eigenvalues if you compute

eig(A-a*eye(2))

Try with a=1, 1i, 0.5+0.5i

2 Implement inverse iteration with shift for the matrix **A**

$$\mathbf{v} = [\lambda \mathbf{I} - \mathbf{A}] \setminus \mathbf{v}$$
$$\mathbf{v} = \mathbf{v} / norm(\mathbf{v})$$
$$\lambda = \mathbf{v}^{\mathrm{T}} \mathbf{A} \mathbf{v}$$

Use the starting guess

$$\lambda = 2i$$
$$\mathbf{v} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

How many iterations do you need to get an accuracy 1e-8?

$$abs(-0.1 + i - \lambda) < 10^{-8}$$