

Practice problems for Midterm 2

- (a) Express the quotient $z = \frac{0.5 + 4i}{3 - 7i}$ in the form $a + bi$.
(b) Let $z = 4 + 0.3i$, $w = -7 + 10i$. Find $z \cdot \bar{w}$.
(c) Let $z = 2 + 2\sqrt{3}i$. Write z and \bar{z} in polar coordinates.
(d) Write $\pi e^{i\frac{\pi}{4}} + i(e^{-i\frac{\pi}{2}})$ in the form $a + bi$.

- (a) Find all values of a such that the matrix below is invertible:

$$A = \begin{pmatrix} 1 & a & 2 \\ 3 & 4 & a \\ 1 & 2 & -3 \end{pmatrix}.$$

- (b) Solve $A\bar{x} = \bar{b} = \begin{pmatrix} 6 \\ 6 \\ 6 \end{pmatrix}$ via the inverse matrix approach (for $a = 0$).

- (c) Solve $A\bar{x} = \bar{b} = \begin{pmatrix} 6 \\ 6 \\ 6 \end{pmatrix}$ via the augmented matrix approach (for $a = 0$).

- Let $A = \begin{pmatrix} 0 & 1 & -1 \\ 1 & 0 & -1 \\ -1 & -1 & 0 \end{pmatrix}$.

- (a) Use the characteristic equation to verify that $\lambda = 2$ is an eigenvalue of A .
(b) Find an eigenvector corresponding to $\lambda = 2$.

- Consider the matrix $A = \begin{pmatrix} -1 & 5 \\ -2 & 5 \end{pmatrix}$.

- (a) Find the eigenvalues of A .
(b) Provide an eigenvector for each of the eigenvalues found in (a).