The test contains 8 questions, each of equal value. Whenever possible, answers should be written using exact numbers. For example: write \( \frac{2}{3} \) instead of 0.67, \( \pi \) instead of 3.1415, \( e^2 \) instead of 7.4, etc.

1. Evaluate:
\[
\left| \frac{2 - 3i}{2 + 3i} \right|
\]

2. Express the following complex number in the \( x + iy \) form.
\[
e^{(i\pi/4) + \ln(2)/2}
\]

3. Solve the following set of equations:
\[
\begin{align*}
14 - x + 5y &= 0 \\
7z + 2x - 15 &= 0 \\
x - y + 3z &= 9.
\end{align*}
\]

4. Find all values of \( a, b, c \) so that the following is an orthogonal matrix.
\[
\begin{pmatrix}
\frac{1}{2} & 0 & a \\
0 & 1 & b \\
\sqrt{3}/2 & 0 & c
\end{pmatrix}
\]

5. Find the cosine of the angle between the two vectors in \( \mathbb{R}^5 \):
\[
(2, 0, 4, 6, 5), (-5, 1, 5, 3, -2)
\]

6. Find the eigenvalues and the respective eigenvectors of
\[
\begin{pmatrix}
2 & 2 \\
2 & -1
\end{pmatrix}
\]

7. Rotate to principal axes the following conic:
\[
2x^2 + 4xy - y^2 = 24
\]
(Use your result for the previous problem.)

8. Show that the product \( AB \) of two arbitrary \( n \times n \) orthogonal matrices is also an orthogonal matrix. (Recall that a matrix \( C \) is said to be orthogonal if \( C^T = C^{-1} \).)