Homework 7
MATH 132

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1. Find matrices representing the transformation $T : \mathbb{R}^2 \to \mathbb{R}^2$ defined by $T(x, y) = (2x - y, 5x + 2y)$ with respect to the standard basis, R_E and with respect to $B = \{(1, 1), (3, 5)\}$, R_B. Then find a matrix C such that $C^{-1}R_EC = R_B$.

2. Find the matrix representing reflection about the plane $2x - 3y - z = 0$ with respect to the standard basis.

3. If A and B are similar matrices, show that A^k and B^k are similar matrices.

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4. Find the eigenvalues of the transformation $T(x, y, z) = (2x+2z, y, x+3z)$. Determine if T is diagonalizable.

5. Let $T : P_3 \to P_3$ defined by $T(p(x)) = xp'(x) + p''(x)$. Is T diagonalizable?

6. The transformation $T(x, y, z) = (2x + 3z, 3y, x + 4z)$ is diagonalizable. Determine $T^3(1, 1, -2)$.

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7. If $z = 2 - 5i$, find $|z|$, $\overline{z}$ and z^{-1}.

8. If $z = 2 - i$ and $w = 3 + 7i$, express $\frac{z}{w}$ in the form $a + bi$ for some real numbers a and b.

9. Find the modulus and principal argument of of $-6 + 2\sqrt{3}i$.

10. Express $(1 - i)^5$ in the form $a + bi$.