Assignment 2

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Question:

If the matrix $\begin{pmatrix} 6 & -x^2 \\ 2x-15 & 10 \end{pmatrix}$ is symmetric, then find the value of x.

Solution:

For a symmetric matrix, $\mathbf{A}^\top = \mathbf{A}$.
Thus, for the matrix $\mathbf{A}$,

$$a_{12} = a_{21} \tag{1}$$
$$\implies 2x - 15 = -x^2 \tag{2}$$
$$\implies x^2 + 2x - 15 = 0 \tag{3}$$
$$\implies x^2 + 5x - 3x - 15 = 0 \tag{4}$$
$$\implies x(x+5) - 3(x+5) = 0 \tag{5}$$
$$\implies (x-3)(x+5) = 0 \tag{6}$$

The roots of the equation $x^2 + 2x - 15 = 0$ are -5 and 3.
Thus, the values of x for which the matrix $\begin{pmatrix} 6 & -x^2 \\ 2x-15 & 10 \end{pmatrix}$ is symmetric, is -5 and 3.