

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, $\mathbf{A}^T = \mathbf{A}$. Thus,

$$\begin{pmatrix} 6 & 2x-15 \\ -x^2 & 10 \end{pmatrix} = \begin{pmatrix} 6 & -x^2 \\ 2x-15 & 10 \end{pmatrix} \quad (1)$$

$\mathbf{A}^T = \mathbf{A}$ only if each individual elements are equal. Thus,

$$2x - 15 = -x^2 \quad (2)$$

$$\Rightarrow x^2 + 2x - 15 = 0 \quad (3)$$

$$\Rightarrow x^2 + 5x - 3x - 15 = 0 \quad (4)$$

$$\Rightarrow x(x+5) - 3(x+5) = 0 \quad (5)$$

$$\Rightarrow (x-3)(x+5) = 0 \quad (6)$$

$$\Rightarrow \boxed{x = -5, 3} \quad (7)$$

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.

of the equation $x^2 + 2x - 15$ are -5 and 3.

Output of the program used to verify whether the solution is correct:

```
[vishal@fedora code]$ python check.py
For x = -5.0, Matrix is symmetric
For x = 3.0, Matrix is symmetric
```

Fig. 2. Output of Program

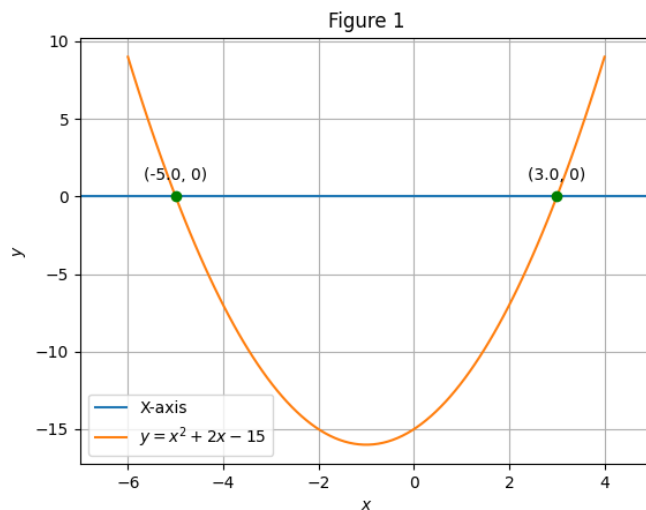


Fig. 1. Graph of the equation $x^2 + 2x - 15 = 0$

By the above graph, it is verifiable that roots