EE3900 : Assignment-5

Nelakuditi Rahul Naga - AI20BTECH11029

Download all python codes from

https://github.com/Rahul27n/EE3900/blob/main/
Assignment_5/Assignment_5.py

and latex-tikz codes from

https://github.com/Rahul27n/EE3900/blob/main/
Assignment_5/Assignment_5.tex

1 QUESTION: QUADRATIC FORMS Q2.17

Find a quadratic polynomial, the sum and product of whose zeroes are -3 and 2, respectively.

2 SOLUTION

A general polynomial equation $p(x, y)$ of degree 2 is given by :

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0 \quad (2.0.1)$$

The vector equation of $p(x, y)$ is given by :

$$\mathbf{x^T} \begin{pmatrix} A & \frac{B}{2} \\ \frac{B}{2} & C \end{pmatrix} \mathbf{x} + \begin{pmatrix} D & E \end{pmatrix} \mathbf{x} + F = 0 \quad (2.0.2)$$

As the polynomial we have to find is a quadratic polynomial we have :

$$B = 0 \quad (2.0.3)$$
$$C = 0 \quad (2.0.4)$$
$$E = 0 \quad (2.0.5)$$

If we take $A = 1$, we have :

$$\text{Sum of zeroes} = -D = -3 \implies D = 3 \quad (2.0.6)$$
$$\text{Product of zeroes} = F = 2 \quad (2.0.7)$$

Substituting the values in (2.0.2), the required quadratic polynomial is given by :

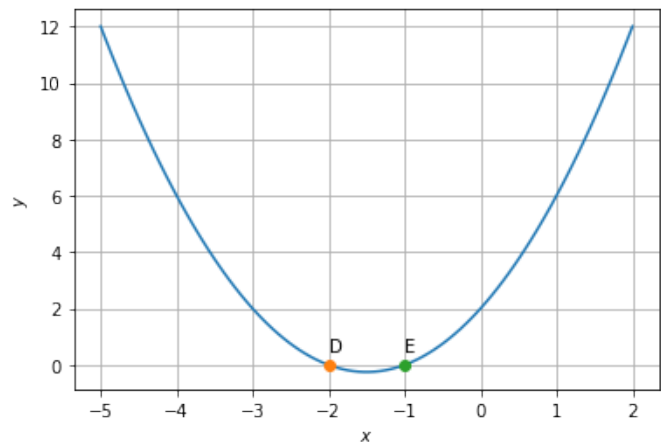$$\mathbf{x^T} \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 3 & 0 \end{pmatrix} \mathbf{x} + 2 = 0 \quad (2.0.8)$$

Fig. 0: Quadratic polynomial with zeroes -1 and -2