

AI1110 Assignment 1

Abhinav Yadav, cs21btech11002

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Q11 (b): The product of two consecutive natural numbers which are multiples of 3 is equal to 810. Find the two numbers.

Solution:

Let the two consecutive natural numbers which are multiples of 3 be $3n$ and $3n + 3 \quad \exists n \in \mathbb{N}$

According to the question:

$$\begin{aligned}
 & 3n(3n + 3) = 810 & (1) \\
 \Rightarrow & 9n(n + 1) = 810 & (2) \\
 \Rightarrow & n(n + 1) = 90 & (3) \\
 \Rightarrow & n^2 + n - 90 = 0 & (4) \\
 \Rightarrow & (n + 10)(n - 9) = 0 & (5) \\
 \Rightarrow & n = -10 \quad \text{or} \quad n = 9 & (6)
 \end{aligned}$$

discarding $n = -10$ as $n \in \mathbb{N}$

$$\begin{aligned}
 \Rightarrow & n = 9 & (7) \\
 \Rightarrow & 3n = 27 & (8) \\
 \Rightarrow & 3n + 3 = 30 & (9)
 \end{aligned}$$

The two numbers are: 27, 30

Plot of (4) is:

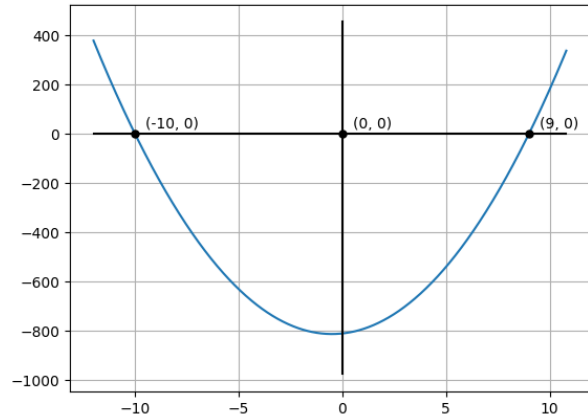


Fig. 1. Plot showing the polynomial in (4)

It can be easily verified by observing the plot that the roots of (4) are 9 and -10.

The output of the program used to find and verify these numbers is:

```

$ python find_nums.py
The consecutive natural numbers n1 and n2 s.t.
n1 % 3 == 0 and n2 % 3 == 0 and n1*n2 == 810 are:
n1=27 n2=30
  
```

Fig. 2. Output of the python program