

AI1110 Assignment 1

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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:

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

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

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

The two numbers are:

27, 30

Plot of $eq^n(1)$ is:

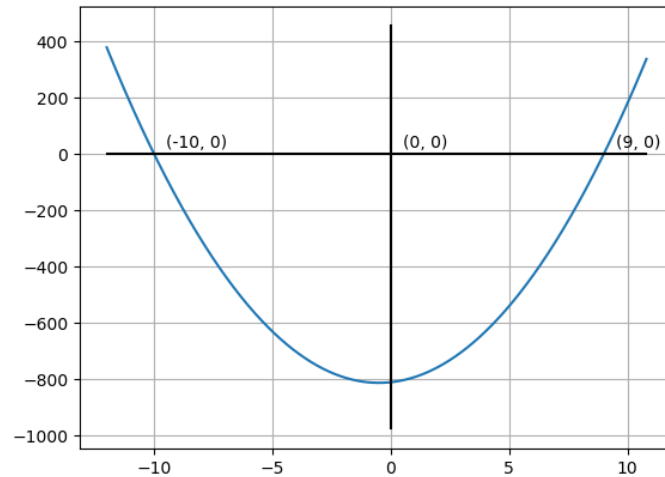


Figure 1: Plot showing the polynomial in $eq^n(1)$

It can be easily verified by observing the plot that the roots of $eq^n(1)$ 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
```

Figure 2: Output of the python program