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:

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

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

$$\Rightarrow \quad n = 9 \tag{7}$$
$$\Rightarrow \quad 3n = 27 \tag{8}$$
$$\Rightarrow \quad 3n+3 = 30 \tag{9}$$

The two numbers are: $\boxed{27, 30}$

Plot of $eq^n(4)$ is:

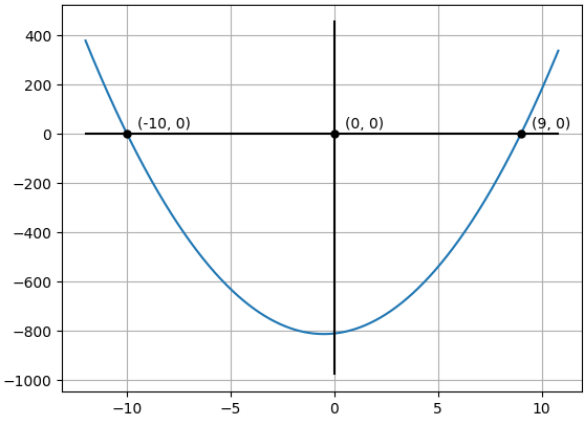

Fig. 1. Plot showing the polynomial in $eq^n(4)$

It can be easily verified by observing the plot that the roots of $eq^n(4)$ 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