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:

$$3n(3n+3) = 810$$
$$\Rightarrow 9n(n+1) = 810$$
$$\Rightarrow n(n+1) = 90$$
$$\Rightarrow n^2 + n - 90 = 0 \qquad -(1)$$
$$\Rightarrow (n+10)(n-9) = 0$$
$$\Rightarrow n = -10 \quad \textit{or} \quad n = 9$$

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

$$\Rightarrow n = 9$$
$$\Rightarrow 3n = 27$$
$$\Rightarrow 3n + 3 = 30$$

The two numbers are:

$$\boxed{27, 30}$$

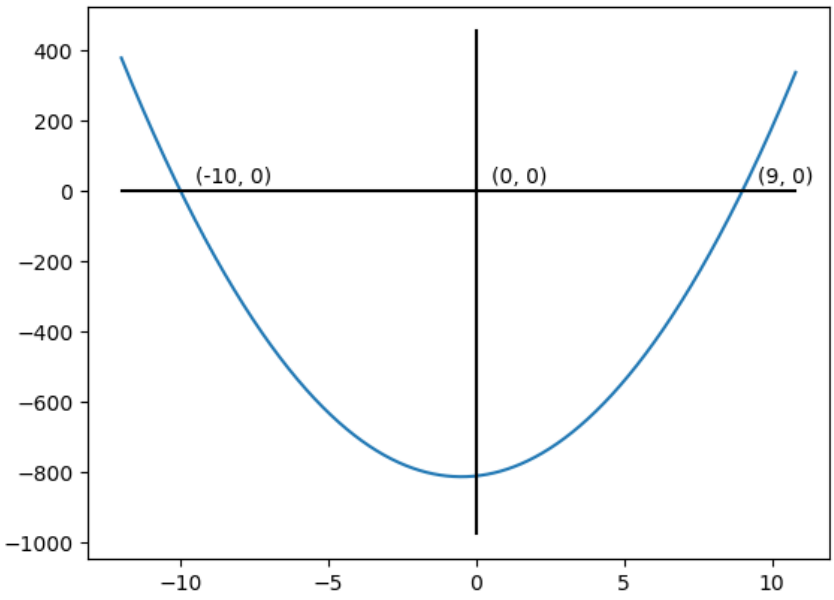

Figure 1: Plot showing the polynomial in $eq^n(1)$

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