Answer on Question #79403 – Math – Algebra

Question

1. Write an odd natural number as a sum of two integers $m1$ and $m2$ in a way that $m1 * m2$ is maximum.

Solution

Let $m1$ and $m2$ be integers.

Then $m1 + m2 = 2k + 1$, from where $m2 = 2k + 1 - m1$.

Let $y = m1 * m2 = m1 * (2k + 1 - m1) = m1(2k + 1) - m1^2$

So $y = -m1^2 + m1(2k + 1) = f(m1)$

It`s the equation of a parabola that opens downwards. Its highest point is the y-coordinate of the vertex, which occurs, when $m1 * m2$ is maximum.

Find the x-coordinate of the vertex:

$x_{max} = -(2k + 1)/-2 = k + 0{,}5$

We need an integer, so $x = k$.

Hence,

$m1 = x = k, m2 = 2k + 1 - k = k + 1$

If we choose integer $x = k + 1$, then

$m1 = x = k + 1,$

$m2 = 2k + 1 - k - 1 = k$

Answer: k and $k + 1$.