3.

Solution

Quadratic function: is a function that can be written in the form:

$n(r) = ar^2 + br + c$ where a, b, and c are real numbers and $a \neq 0$

we have $n(r) = -3r^2 + 2r - 7$,   note: $-3r^2 + 2r - 7$ is in rn-plane

Here, we know that $a = -3$, $b = 2$, $c = -7$

Since $a < 0$, we know that the n-coordinate of the vertex is a maximum. However, to find the n-coordinate of our vertex we first need to find the r-coordinate

of the vertex by using $r = -\frac{b}{2a} = -\frac{2}{-6} = \frac{1}{3}$ Now that we have the r-coordinate, we can find the n-coordinate

of the vertex by finding $n\left(\frac{1}{3}\right) = -3\left(\frac{1}{3}\right)^2 + 2\left(\frac{1}{3}\right) - 7 = -\frac{1}{3} + \frac{2}{3} - 7 = -\frac{20}{3}$ Maximum $= -\frac{20}{3}$