5.

Solution

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

$r(z)=az^2+bz+c$ where a, b, and c are real numbers and $a\neq 0$

we have $r(z)=3z^2+12z+20$, note: $3z^2+12z+20$ is in zr-plane

Here, we know that $a=3$, $b=12$, $c=20$

Since $a>0$,we know that the r-coordinate of the vertex is a minimum. However,to find the r-coordinate of our vertex we first need to find the z-coordinate of the vertex by using $z=-\frac{b}{2a}=-\frac{12}{6}=-2$ Now that we have the z-coordinate, we can find the r-coordinate of the vertex by finding $r(-2)=3(-2)^2+12(-2)+20=12-24+20=8$ Minimum=8