4.

Solution

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

$g(u)=au^2+bu+c$ where a, b, and c are real numbers and $a\neq 0$

we have $g(u)=-u^2-u-8$, note: $-u^2-u-8$ is in ug-plane

Here, we know that $a=-1$, $b=-1$, $c=-8$

Since $a<0$,we know that the g-coordinate of the vertex is a maximum.However,to find the g-coordinate of our vertex we first need to find the u-coordinate of the vertex by using $u=-\frac{b}{2a}=-\frac{-1}{-2}=-\frac{1}{2}$ Now that we have the u-coordinate, we can find the g-coordinate of the vertex by finding $g\left(-\frac{1}{2}\right)=-1\left(-\frac{1}{2}\right)^2-1\left(-\frac{1}{2}\right)-8=-\frac{1}{4}+\frac{1}{2}-8=-\frac{31}{4}$ Maximum$=-\frac{31}{4}$