

4.

Solution

To find the vertex, we look at the coefficients in the function $g(u) = au^2 + bu + c$ in this equation, $a = 3$ and $b = 9$

The first coordinate of the vertex has the formula: $\frac{-b}{2a}$ now, plugging into formula to get:

$$\frac{-b}{2a} = -\frac{9}{2(3)} = -\frac{3}{2}$$

$$\begin{aligned}\text{The second coordinate of the vertex is } g\left(-\frac{3}{2}\right) &= 3\left(-\frac{3}{2}\right)^2 + 9\left(-\frac{3}{2}\right) - 6 \\ &= -\frac{51}{4}\end{aligned}$$

Therefore, the vertex of the graph of f is $\left(-\frac{3}{2}, -\frac{51}{4}\right)$