5.

Solution

To find the vertex, we look at the coefficients in the function $x(k)=ak^2+bk+c$
in this equation, $a=1$ and $b=2$
The first coordinate of the vertex has the formula: $\frac{-b}{2a}$ now, plugging into formula to get:
$\frac{-b}{2a}=-\frac{2}{2(1)}=-1$
The second coordinate of the vertex is $x(-1)=1(-1)^2+2(-1)-4$
$=-5$
Therefore, the vertex of the graph of f is $(-1,-5)$