4.

Solution

To find the vertex, we look at the coefficients in the function $x(m)=am^2+bm+c$
in this equation, $a=2$ and $b=2$
The first coordinate of the vertex has the formula: $\frac{-b}{2a}$ now, plugging into formula to get:
$\frac{-b}{2a}=-\frac{2}{2(2)}=-\frac{1}{2}$
The second coordinate of the vertex is $x(-\frac{1}{2}) = 2(-\frac{1}{2})^2+2(-\frac{1}{2})-5$
$=-\frac{11}{2}$
Therefore, the vertex of the graph of f is $(-\frac{1}{2},-\frac{11}{2})$