

3.

## Solution

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

$q(k) = ak^2 + bk + c$  where  $a$ ,  $b$ , and  $c$  are real numbers and  $a \neq 0$

we have  $q(k) = -3k^2 + 3k + 4$ , note:  $-3k^2 + 3k + 4$  is in  $kq$ -plane

Here, we know that  $a = -3$ ,  $b = 3$ ,  $c = 4$

Since  $a < 0$ , we know that the  $q$ -coordinate of the vertex is a maximum. However, to find the  $q$ -coordinate of our vertex we first need to find the  $k$ -coordinate of the vertex by using  $k = -\frac{b}{2a} = -\frac{3}{-6} = \frac{1}{2}$ . Now that we have the  $k$ -coordinate, we can find the  $q$ -coordinate

of the vertex by finding  $q\left(\frac{1}{2}\right) = -3\left(\frac{1}{2}\right)^2 + 3\left(\frac{1}{2}\right) + 4 = -\frac{3}{4} + \frac{3}{2} + 4 = \frac{19}{4}$ . Maximum =  $\frac{19}{4}$