BECA / IB Math 03-Quadratic functions Name:
4 January 2022

3.2 Graphing quadratic functions

Useful forms of equations for quadratics:

$f(x) = ax^2+bx+c$, with y-intercept c, axis of symmetry $x = -\dfrac{b}{2a}$, zeros $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$g(x) = a(x-p)(x-q)$, with x-intercepts p, q and axis of symmetry $x = \dfrac{p+q}{2}$

$h(x) = a(x-h)^2+k$, with vertex (h, k)

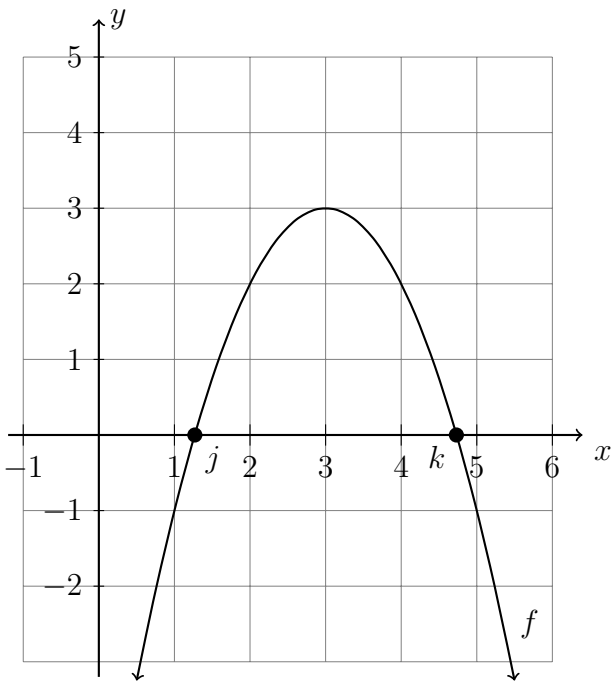
1. Do Now: The function $f(x) = -x^2+6x-6$ is shown on the graph.

   (a) Write down its vertex as an ordered pair.

   (b) Write down the domain and range of f.

   (c) Draw on the graph the function $g(x) = -x+4$.

   (d) Write down the two ordered pairs that satisfy both f and g.



   (e) Find the exact values of j and k, the x-intercepts of f. (as an expression with radicals, not a decimal)

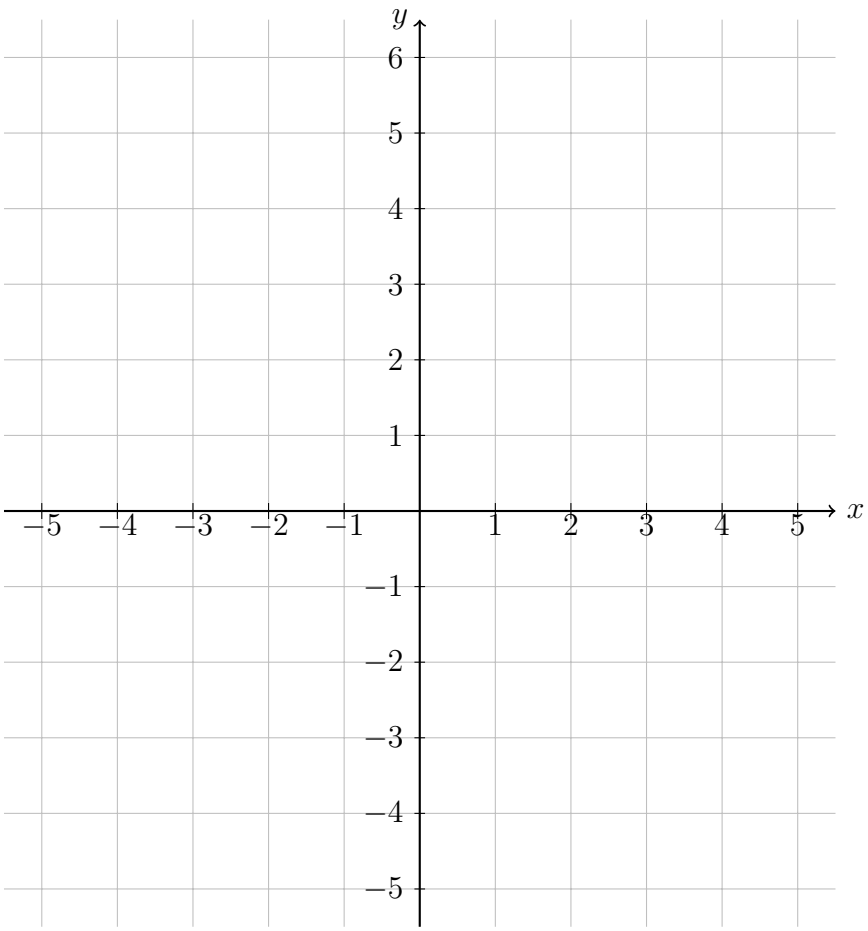
2. Consider the function $f(x) = x^2 + 2x - 3$.

   (a) Sketch the graph of f, for $-4 \leq x \leq 2$. Label the vertex and the intercepts.

   (b) This function can also be written in the form $f(x) = (x - p)^2 - 4$.
   Write down the value of p.

   (c) The graph of f has two solutions for $f(x) = 0$. Write down the solutions (or roots, zeros) of the function.

   (d) Hence, write down the function in factored form, $f(x) = (x - a)(x - b)$.



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Sketching a quadratic function

3. Given $f(x) = (x-3)^2 - 4$

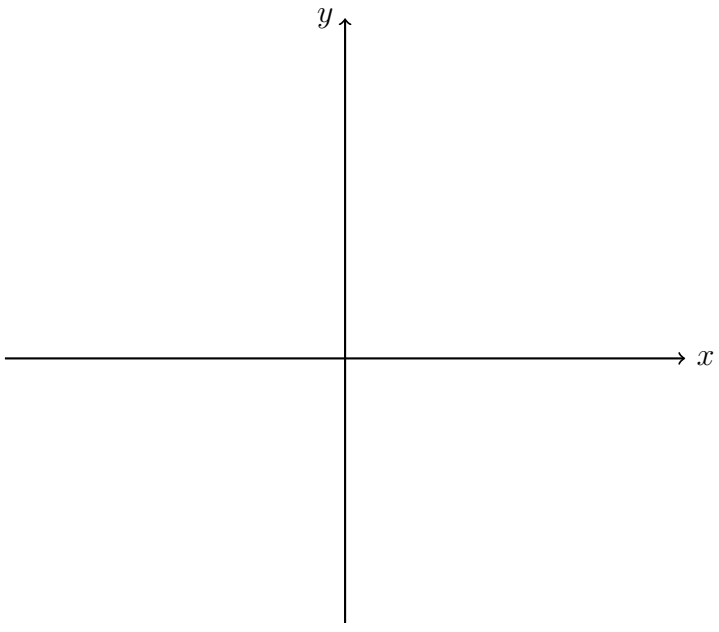
   (a) Write down the vertex of the function as an ordered pair.

   (b) Expand the function from vertex form to standard form, ax^2+bx+c where $a, b, c \in \mathbb{R}$.

   (c) Write down the value of $f(0)$. Explain what this represents on the graph.

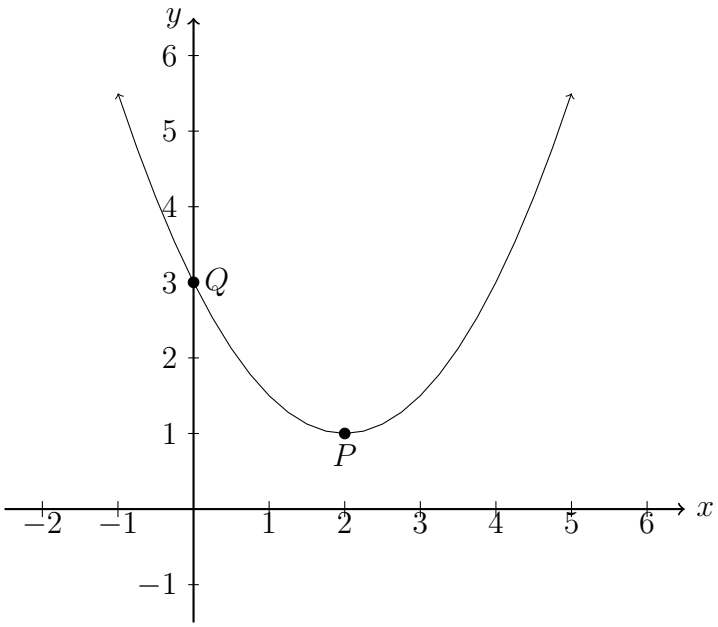
   (d) Factor the function. Write down the roots.

   (e) Sketch the function, labeling the intercepts with values and the vertex as an ordered pair. Show the axis of symmetry as a dotted line and label it with its equation.



   (f) Write down the domain and range of the function.

4. Let f be a quadratic function. Part of the graph of f is shown below. The vertex is at $P(2, 1)$ and the y-intercept is at $Q(0, 3)$.



(a) Write down the equation of the axis of symmetry.

(b) The function f can be written in the form $f(x) = a(x - h)^2 + k$. Write down the value of h and of k.

(c) Find a.