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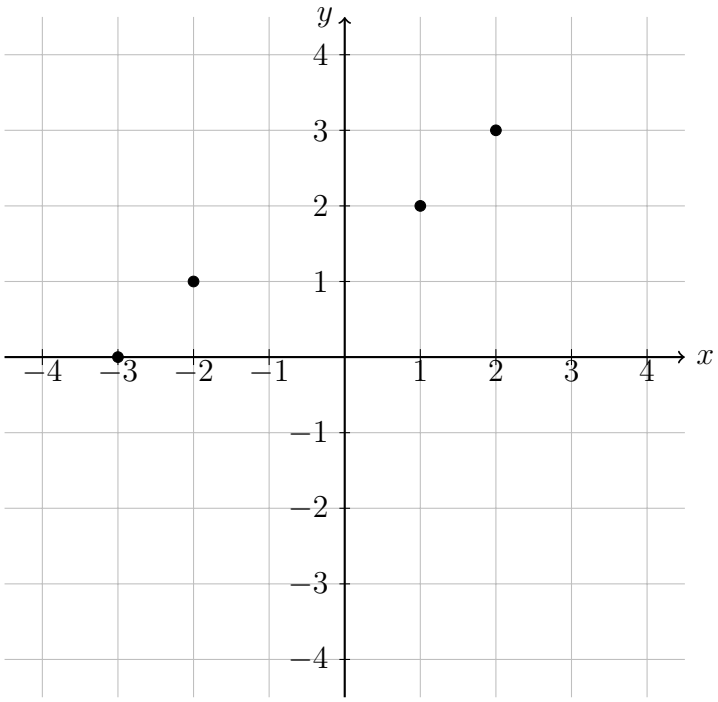
15 November 2018

Unit 3 Test: Quadratics functions

Answer on loose leaf paper in pen, or, for the graphs, on graph paper in pencil. Show working for all problems.

1. Let $f(x) = 3x - 4$ and $g(x) = 5x$, for $x \in \mathbb{R}$.
   (a) Write down $g(-3)$.
   (b) Find $(f \circ g)(x)$.
   (c) Find $f^{-1}(x)$.
2. Let $f(x) = 3x - 1$ and $g(x) = -2x^2 + 2$
   (a) Find $f^{-1}(x)$.
   (b) Find $(f \circ g)(1)$.
3. The diagram below shows the graph of a function f, composed of four points.



   (a) Write down the value of $f(2)$.
   (b) Write down the domain of f.
   (c) Write down the range of f.
   (d) Write down the value of $f^{-1}(1)$.
   (e) Sketch the inverse of f, f^{-1}, on the grid above.

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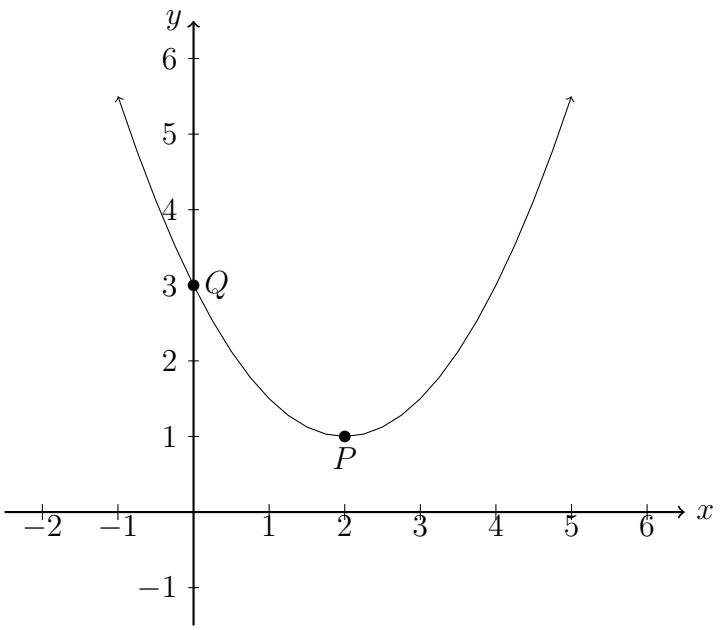
4. Let $f(x) = 3x - 1$ and $g(x) = -2x^2 + 2$

   (a) Find $f^{-1}(x)$.

   (b) Find $(f \circ g)(1)$.

5. 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.

6. Let $f(x) = 3x^2 - 12x + 7$.

   (a) Write down the coordinates of the vertex.

   (b) Hence or otherwise, express the function in the form $f(x) = 3(x - h)^2 + k$.

   (c) Solve the equation $f(x) = 0$.

7. Consider the equation $x^2 + (k - 2)x = -4$, where k is a real number. Find the values of k for which the equation has two equal real solutions.