Challenge 138: What's the point?

The curve with equation $y = x^2 – 2x – 3$, where b and c are positive real numbers, crosses the x-axis at A and B, and the y-axis at C.

If you draw the circle that goes through all the points A, B and C, what are the co-ordinates of the other point where it crosses one of the axes?

What about the curve with equation $y = x^2 – x – 3$? Or $y = x^2 – 3x – 3$?

Can you generalise for curves of the form $y = x^2 – bx – c$, where b and c are positive real numbers?