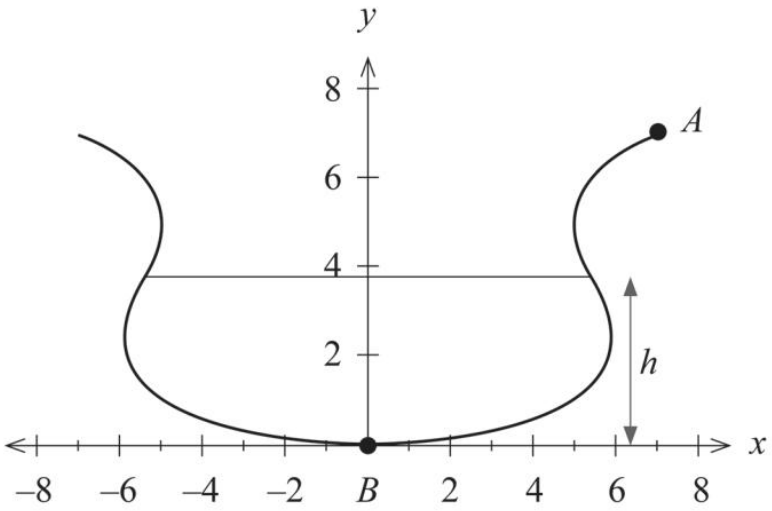
Question 17 **(7 marks)**

The shape of a decorative vase is modelled by revolving the curve AB about the y axis where $x = \sqrt{y\left(y^2 - 11y + 35\right)}$ with $0 \leq y \leq 7$. All dimensions are in centimetres.



(a) Determine an integral expression, in terms of h, for the volume of water in the vase if it is filled to a depth of h cm. (2 marks)

Water is poured into the initially empty vase at a constant rate of 50 cm^3/s.

(b) Determine the time taken to fill the vase to a depth of 6 cm. (2 marks)

With the depth at 6 cm, another 30 cm^3 of water is added to the vase.

(c) Using the increments formula, calculate the approximate change in depth of water in the vase. (3 marks)