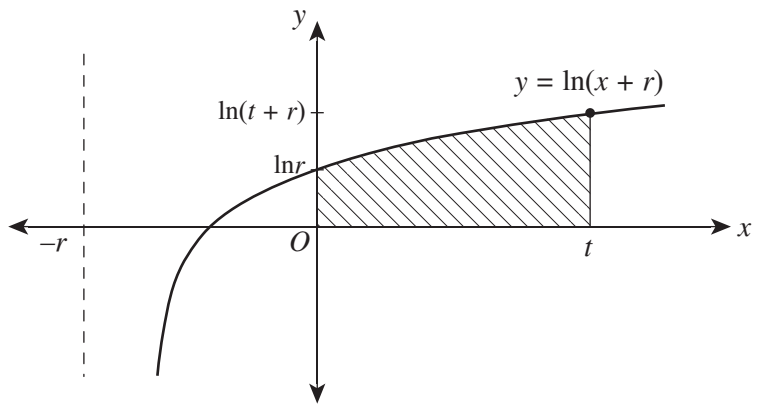
Question 27 (3 marks)

Consider the graph of $y = \ln(x + r)$ shown below. Let $r > 1$. **3**



The region bound by the curve $y = \ln(x + r)$, the coordinate axes, and the line $x = t$ is used as a model for a garden, where $t > 0$.

You may assume without proof that the equation of the curve is equivalently expressed as $x = e^{y} - r$.

Show that the area of this region, A, in terms of r and t is $A = (t + r)\ln(t + r) - r\ln r - t$.

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