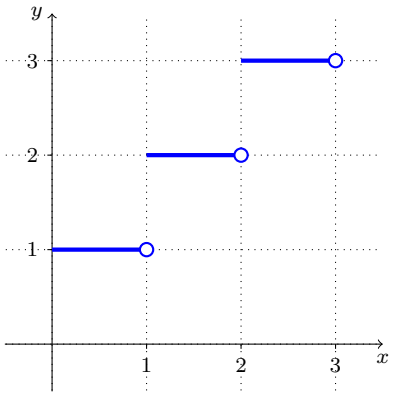
Continually Thinking

Let $g(x)$ be the step function shown below, and define $G(x) = \int_0^x g(t)\,dt$.

1. What are the values of $G(1)$, $G(2)$, and $G(3)$?



2. Let $x \in [0, 1)$. Evaluate the integral to find a formula for $G(x)$.

3. Let $x \in [1, 2)$. Find a formula for $G(x)$. *Hint: write* $\int_0^x g(t)\,dt$ *as* $\int_0^1 g(t)\,dt + \int_1^x g(t)\,dt$.

4. Find a formula for $G(x)$ if $2 \le x < 3$. Then write a piecewise formula for $G(x)$ on the interval $[0, 3)$.

5. Where is $G(x)$ continuous?