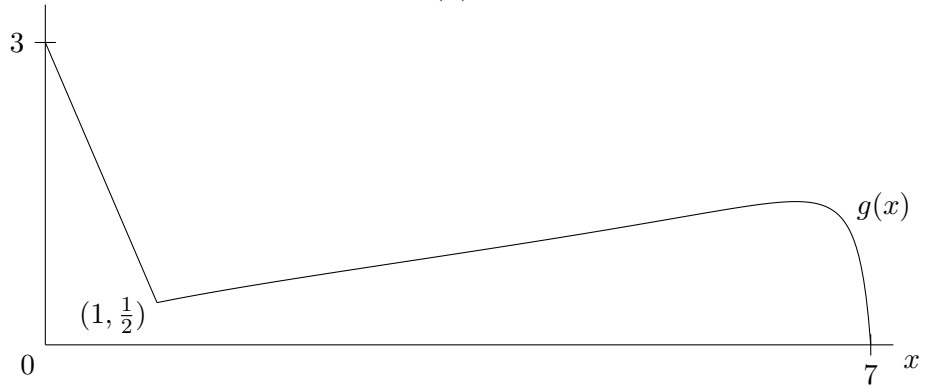
10. [8 points] The graph of part of a function $g(x)$ is pictured below.



a. [4 points] A thumbtack has the shape of the solid obtained by rotating the region bounded by $y = g(x)$, the x-axis and y-axis, about the y-axis. Find an expression involving integrals that gives the volume of the thumbtack. Do not evaluate any integrals.

Solution: Using the cylindrical shell method, the volume of the thumbtack is $\displaystyle\int_0^7 2\pi x g(x)$.

b. [4 points] A door knob has the shape of the solid obtained by rotating the region bounded by $y = g(x)$, the x-axis and y-axis, about the x-axis. Find an expression involving integrals that gives the volume of the door knob. Do not evaluate any integrals.

Solution: Using the washer method, the volume of the door knob is $\displaystyle\int_0^7 \pi(g(x))^2 dx$.