Problem 1. Let $\mathcal{R}$ be the region bounded by the curves $y = x^2 + 2$, $y = 6$, $x = 2$, and the $y$-axis.

i. Sketch and find the area of $\mathcal{R}$.

ii. Find the volume of the solid obtained by rotating $\mathcal{R}$ about the line $y = -1$. 