Problem 1: Derive the formula for the volume of a right-circular cone of radius $r$ and height $h$ by revolving the line $y = \frac{r}{h}x$ (from $x = 0$ to $x = h$) about the $x$-axis.

Problem 2: Consider the region bounded by $y = x^2$, $y = \sqrt{x}$ on $[0,1]$; let’s call this region $A$.

(i) If we revolve $A$ about the $x$-axis, do we get the same volume as when we revolve it about the line $y$-axis? Write down a prediction before calculating the volumes. Explain why you were right or wrong. (Hint: you should talk about symmetry.)

(ii) If we revolve $A$ about the $y$-axis, do we get the same volume as when we revolve it about the line $x = 1$? Write down a prediction before calculating the volumes. Explain why you were right or wrong. (Hint: you should talk about symmetry.)

(iii) What if we compare revolving $A$ about the $x$-axis and revolving it about $y = 1$? Same drill.