Justify your answers to the following questions.

Question 1. [4 marks] Find the volume of the solid obtained by rotating about the $y$-axis the region bounded by $y = \sin^{-1}(x), x = 1, \text{ and } y = 0$.

Question 2. [3 marks] Find the average value of the function $f(x) = \cot^3(x) \csc(x)$ on the interval $[\pi/4, \pi/2]$.