Problem: \textit{A funnel-shaped tank}

Consider the region \( R \) bounded by \( y = -\frac{1}{\sqrt{x}}, x = 0, x = 1, \) and \( y = -1 \).

(a) Calculate the area of the region

(b) A funnel-shaped tank is formed by revolving the region \( R \) around the \( Y \)-axis. Calculate the volume of this tank.

(c) If the funnel-shaped tank is full of liquid of density \( \rho \), then calculate the work done to empty it to a horizontal level 1 unit above the top of the tank.