Show all work. 5 points each.

1) Use integration by parts to find the integral. Make sure you indicate what $u, du, v$ and $dv$ are.

\[\int x \ln(x) \, dx\]

2) Finding the volume of the solid of revolution found by rotating about the $x$-axis the region bounded by $f(x) = \sqrt{x}, y = 0, x = 1, x = 2$. 