Problem 1: (a) Find the limit of the sequence, if it converges.

\[ a_n = \left(1 - \frac{2}{n}\right)^n \]

(b) Evaluate the integral.

\[ \int \frac{1}{u^2(u^2 - 1)} \, du \]
Problem 2: (a) Calculate the area under the curve $y = \frac{1}{x^{0.8}}$ for $x \geq 1$.

(b) Calculate the volume of the solid obtained by taking the region below $y = \frac{1}{x^{0.8}}$ and above $y = 0$ for $x \geq 1$, and rotating it about the $x$-axis.

(c) Write 1-2 sentences comparing your findings in part (a) with those of part (b).
Problem 3: Find the arc length of the curve $y = \ln(x)$ from $x = 1$ to $x = 4$.

Hint: Try to avoid trig substitution.