1. Calculate the improper integral $\int_1^\infty \frac{1}{x^2}\,dx$ by hand. Be sure to show all the details. *(5 points)*

2. Approximate the area enclosed by the curves $y = \ln(x+1)$ and $y = x^2$ correct to two decimal places. *(5 points)*

3. Find the volume of the solid obtained by rotating about the x-axis the area contained below the curve $y = \sin^2 x$ and above the x-axis from $x = 0$ to $x = \pi$. Use your calculator, but give the exact answer. *(5 points)*

4. Find the approximate arclength of the curve $y = \ln x$ from $(1,0)$ to $(e,1)$. *(5 points)*