1. Compute the area between the curves $y = x$ and $y = x^3$.

\[
\frac{1}{2}
\]

2. Compute the volume of the solid of revolution obtained by revolving the region under $y = 2e^x$ between $x = 0$ and $x = 1$ about the $x$-axis.

\[
2\pi(e^2 - 1)
\]