1. (3 points) Find the average value of the function \( f(x) = \frac{12}{4x^2 + 1} \) on the interval \([0, 1/2]\). Simplify your answer.
2. Let \( R \) be the finite region bounded by the graphs determined by the following equations.

\[
y = 5 \ln (x)
\]
\[
x = e^2
\]
\[
y = 15
\]

Set up, but do not evaluate, definite integrals which represent the volumes of the following solids.

(a) (3 points) The volume of the solid with base \( R \) for which the cross-sections perpendicular to the \( x \)-axis are semicircles.
(b) The volume of the solid formed when $R$ is revolved around the line $y = 18$. Set up the integrals for this volume in the following two ways.

i. (2 points) Integrate with respect to $x$.

ii. (2 points) Integrate with respect to $y$. (Use different integrands in parts $i$ and $ii$.)