Answer ALL questions. Unless instructed otherwise, you should show ALL your work and simplify your final answer as much as possible. Please box your final answer to each part.

Problem 1: [8 pts]   Find the following indefinite integral

$$\int \frac{27x^3}{\sqrt{9x^2 - 4}}\,dx$$

Problem 2: [9 pts]   Find the area of the bounded region between the curves $y = \dfrac{x^2}{x^2 + 5x + 6}$ and $y = \dfrac{1}{x^2 + 5x + 6}$.

Problem 3: [8 pts]   The unbounded region R is bounded above by the curve $y = \sqrt{xe^{-x}}$, below by the x-axis and to the left by the y-axis. This region R is rotated about the x-axis. Is the volume of the resulting solid finite or infinite? If it is finite, evaluate it.

This page for rough work.