25 min. No symbolic calculators allowed (TI-89 and similar)! (TI-86 or lower are allowed.) Show all work.

1. (12 points) Compute the following anti-derivatives:

\[ \int \left( x^2 + \sqrt{x} - \frac{1}{x^3} \right) \, dx = \]  

(1a)

\[ \int (x^2 + 4)^5 \cdot 2x \, dx = \]  

(1b)

\[ \int \frac{x^2}{x^3 + 1} \, dx = \]  

(1c)
2. *(5 points)* Approximate the area between the graph of \( y = x^3 \) and the \( x \)-axis for \( 0 \leq x \leq 3 \) using 3 rectangles.

3. *(8 points)* Compute the following definite integrals:

\[
\int_{1}^{2} (x^3 - \frac{1}{x}) \, dx = \quad (2a)
\]

\[
\int_{0}^{1} xe^{x^2} \, dx = \quad (2b)
\]