1. (34 pts) Evaluate the following integrals and simplify your answers.

   (a) $\int \tan^2 \quad + 1 \ \sec^2 \quad d$

   (b) $\int \dfrac{2x^2 \quad 5x + 6}{x^3 + 3x}\, dx$

   (c) $\int \dfrac{dx}{x^2 \sqrt{25 \quad x^2}}$

2. (26 points) Consider the integral $I = \int_{1}^{1} (2 \quad x)e^x \, dx$.

   (a) Estimate the value of I using the trapezoidal approximation T_2. Express your answer in terms of the number e and simplify.

   (b) Estimate the error for the approximation T_2. Express your answer in terms of the number e and simplify.

   (c) Find the exact value of the integral.

3. (22 points) Determine whether the following integrals are convergent or divergent. Explain your reasoning fully for each integral. **If the integral converges, find its value**.

   (a) $\int_{1}^{} x^2 = \quad 3x + 9.$

R. Shade in the region R. 2

valuate, an integral to find the volume of the solid