You must show all of the necessary work to receive credit for a correct answer.

1. (3 points) Suppose that \( f(x) = 12x^3 + \frac{3}{x^2} + \frac{1}{\sqrt{x}}. \)

   (a) Find any antiderivative for \( f(x). \)

   (b) Find an antiderivative for \( f(x) \) such that the graph of the antiderivative goes through the point \( (1,7) \).
2. (3 points) Evaluate the following indefinite integral.

\[ \int \left( x + \frac{1}{x} \right) \, dx \]

3. (4 points) Without using a calculator, find the exact value of the following definite integral. You can of course check your answer with the calculator afterwards, but I won’t give any credit without seeing all of the work by hand justifying your answer.

\[ \int_{0}^{1} \left( e^{2x} + 5x^2 \right) \, dx \]