

1. Evaluate the integral  $\int e^x \cos(e^x) dx$ .

2. Differentiate  $y = 2^{x^3} + \log_{10}(x^2)$ .

3. The number of bacteria in a culture grows according to the equation  $P(t) = 10e^{kt}$  where  $k$  is a constant and the time  $t$  is measured in hours. Find the value of  $k$  if the population has doubled after 2 hours.