1. (2 points each) Evaluate the following indefinite integrals.

(a) \( \int \frac{(x^4 - 6)^2}{x^5} \, dx \)

(b) \( \int \frac{\sec^2(x) - \tan^2(x)}{\sin^4(x) + \sin^2(x) \cos^2(x)} \, dx \)
2. (2 points) Evaluate the following definite integral. Simplify your answer.

\[ \int_{0}^{\frac{1}{2}} \frac{3}{\sqrt{4 - 4x^2}} \, dx \]

3. (2 points) At time \( t \) hours, a bacteria population is growing at a rate of \( 40t + 10 \) bacteria per hour. If the population is 300 at time \( t = 1 \), then what is the population at time \( t = 5 \) hours?
4. (2 points) Suppose $g(x) = \int_3^{2x^3-24x+9} (t^8 + 5)^{42} \, dt$.

Determine each critical number of $g(x)$ and state whether the graph of $g(x)$ has a local maximum, a local minimum or neither at each of those $x$-values.