

Name _____

- You have 20 minutes
- No calculators
- Show sufficient work

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.

$$\int_0^{1/2} \frac{3}{\sqrt{4-4x^2}} dx$$

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.