

Name _____

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

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

(a) $\int (3x^2 - 4) \left(\frac{2}{x^2 + 1} + 9 \right) dx$

(b) $\int \frac{\cos(2x) - 2\cos^2(x) + 6}{\cos(x)\cot(x)} dx$

2. (2 points) Evaluate the following definite integral. Simplify your answer.

$$\int_1^{e^6} \left(\frac{2}{\sqrt[3]{x^2}} + \frac{8}{x} \right) dx$$

3. (2 points) At time t hours, a bacteria population grows at a rate of $100t + 80$ bacteria per hour. If the population is 200 at time $t = 1$, then what is the population at time $t = 3$ hours?

4. (2 points) Let $g(x) = \int_{x^4-32x}^3 \frac{1}{t^{12}+4} dt$. Find the x -coordinate for the highest point on the graph of $g(x)$.