

Name \_\_\_\_\_

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

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

(a)  $\int \frac{3x^2}{x^2 + 1} dx$

(b)  $\int (\cos(2x) + 2\sin^2(x) + \tan^2(x)) dx$

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

$$\int_{-5}^{-1} \frac{3x - 2x^2}{x^2} dx$$

3. (2 points) Suppose  $g(x) = \int_{x^2}^3 \frac{1}{t^4 + 1} dt$ . Find its second derivative  $g''(x)$ .

4. (2 points) The height of a tree is currently 12 inches. If the tree's height increases by  $4\sqrt[3]{t}$  inches per year where  $t$  is measured in years from now, then what will the tree's height be in 8 years?