

Name _____

Date _____

Calculus Independent Study Path

Unit 7 Practice Test

1. Find $\frac{dy}{dx}$:

$$y = (x^2 + 2)^{2-x}.$$

2. Find

$$\lim_{x \rightarrow \infty} \frac{x^p}{e^x},$$

where $p > 1$.

3. Find

$$\int \left(e^x + \frac{x+1}{x} \right) dx.$$

4. Find

$$\int \tan x \, dx = \int \frac{\sin x}{\cos x} dx$$

5. Find r such that $y = e^{rx}$ satisfies

$$\frac{d^4 y}{dx^4} - 13 \frac{d^2 y}{dx^2} + 36y = 0.$$

6. In the *Law of Logistic Growth*, it is assumed that at time t , the rate of growth, $f'(t)$, of a quantity, $f(t)$, is given by $f'(t) = Af(t)[B - f(t)]$ where A and B are constants. If $f(0) = C$, show that

$$f(t) = \frac{BC}{C + (B - C)e^{-ABt}}$$

7. A sociologist claims that the population of a certain country is growing at the rate of 2% per year. If the present population of the country is 200 million people, and the growth rate remains at 2% per year, what would be the population be in the year 2020?