Name_____

Date_____

Calculus Independent Study Path

Unit 6 Practice Test

1. Find the indefinite integral

$$y = \int \sqrt{x^2 + x^4}\, dx.$$

2. If

$$\frac{dy}{dx} = 7x^4 - 7x^3 + 7x^2 + 7x + 7,$$

and $y = 7$ when $x = 0$, find $y(x)$.

3. Find the general solution to

$$\frac{dy}{dx} = \frac{x^2 + x + 1 + \sqrt{x}}{y^2 - \sqrt{y}}.$$

Leave your answer as an implicit function.

4. In a forest natural litter occurs, such as fallen leaves and branches, dead animals, etc. Assume that

   (a) litter falls to the ground continuously at a constant rate of 200 grams per square meter per year, and

   (b) the accumulated litter decomposes continuously at the rate of 50 percent of the amount present per year.

   The difference of the two rates is the rate of change of the amount of litter present with respect to time. Write down a differential equation that relates the amount of litter L to the time t.

5. Find the value of

$$\int_0^1 x(x^2 + 2)^3\, dx.$$

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6. Compute
$$\frac{d}{dx} \int_0^{x^5} \frac{t\,dt}{\sqrt{1+t^2}}.$$

7. Find the area bounded by the x-axis, $x = -3$, $x = 4$, and $y = \sqrt[3]{5-x}$.

8. Graph $x^2 \sin x$ from $x = -2$ to $x = 2$, and then find
$$\int_{-2}^2 x^2 \sin x\,dx$$