

Name: _____

Find each integral

1. $\int \frac{x^{\frac{1}{3}} - 3}{x^{\frac{2}{3}}} dx$

2. $\int (5x - \frac{3}{e^x}) dx$

3. $\int x^2 \sin(\pi x) dx$

4. $\int \frac{(\ln x + 2)^2}{x} dx$

5. $\int \frac{\sin x}{\sqrt{\cos x}} dx$

6. $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

Solve each initial value problem:

7. $\frac{dy}{dx} = \frac{x^2 + 7x + 3}{y^2}$ $y(0) = 3$

8. $\frac{dy}{dx} = 10 + y$ $y(0) = 2$

9.

$$\int \frac{x}{(1 + 4x^2)^2} dx =$$

(A) $\frac{1}{8} \ln(1 + 4x^2) + C$

(B) $\frac{1}{4} \sqrt{1 + 4x^2} + C$

(C) $-\frac{1}{8(1 + 4x^2)} + C$

(D) $-\frac{1}{3(1 + 4x^2)^3} + C$

(E) $-\frac{1}{(1 + 4x^2)} + C$

10.

$$\int \left(\sqrt{t} - \frac{1}{\sqrt{t}} \right)^2 dt =$$

(A) $t - 2 + \frac{1}{t} + C$ (B) $\frac{t^3}{3} - 2t - \frac{1}{t} + C$ (C) $\frac{t^2}{2} + \ln|t| + C$

(D) $\frac{t^2}{2} - 2t + \ln|t| + C$ (E) $\frac{t^2}{2} - t - \frac{1}{t^2} + C$

11.

$$\int x \sin(5x) dx =$$

(A) $-x \cos(5x) + \sin(5x) + C$ (B) $-\frac{x}{5} \cos(5x) + \frac{1}{25} \sin(5x) + C$ (C) $-\frac{x}{5} \cos(5x) + \frac{1}{5} \sin(5x) + C$

(D) $\frac{x}{5} \cos(5x) + \frac{1}{25} \sin(5x) + C$ (E) $5x \cos(5x) - \sin(5x) + C$

12.

$$\int \sec^{3/2} x \tan x dx =$$

(A) $\frac{2}{5} \sec^{5/2} x + C$ (B) $-\frac{2}{3} \cos^{-3/2} x + C$ (C) $\sec^{3/2} x + C$

(D) $\frac{2}{3} \sec^{3/2} x + C$ (E) none of these

13.

Assume $f(x)$ is a differentiable function. Which of the following expressions is equal to

$$\int x^3 f'(x) dx?$$

A. $x^3 f(x) - \int \frac{1}{4} x^4 f(x) dx$

B. $\frac{1}{4} x^4 f(x) + C$

C. $x^3 f''(x) - \int 3x^2 f(x) dx$

D. $x^3 f(x) - \int 3x^2 f(x) dx$

E. $3x^2 f(x) - \int x^3 f(x) dx$

14.

If $\int x^2 \cos x dx = h(x) - \int 2x \sin x dx$, then $h(x) =$

(A) $2 \sin x + 2x \cos x + C$ (B) $x^2 \sin x + C$ (C) $2x \cos x - x^2 \sin x + C$

(D) $4 \cos x - 2x \sin x + C$ (E) $(2 - x^2) \cos x - 4 \sin x + C$