

Write your questions
and thoughts here!**Find the derivative of each function**

$$f(x) = x^2 + 1$$

$$f(x) = x^2 - 5$$

$$f(x) = x^2 + 1000$$

What is the antiderivative of $2x$?**solution**

$$f(x) = x^2 + C$$

solution

$$f(x) = x^2 + 1$$

Integrals without a boundary are called indefinite integrals. In the past, we've been working with definite integrals where the boundaries are given for the area under a curve. Now we will work with indefinite integrals, which means we are finding an antiderivative as a general solution.

Exponential

$$\int e^x dx =$$

$$\int a^x dx =$$

- Find the general solution of $\int 7^x dx$.
- If $f'(x) = e^x - 2x^2$, find the particular solution of $f(x)$ if $f(0) = 4$.

Logarithm as the answer

$$\int \frac{1}{x} dx =$$

- $\int \left(1 - \frac{5}{x}\right) dx$
- If $f'(x) = \frac{2}{x} + \frac{6}{x^2}$, find the particular solution of $f(x)$ if $f(1) = -7$.

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Trig Integrals:

$$\int \cos x \, dx =$$

$$\int \csc x \cot x \, dx =$$

$$\int \sin x \, dx =$$

$$\int \sec x \tan x \, dx =$$

$$\int \sec^2 x \, dx =$$

$$\int \csc^2 x \, dx =$$

5. $\int (3 \sec^2 x) \, dx$

6. If $\frac{dy}{dx} = 1 - \sin x$, find the particular solution of $f(x)$ if $f(\pi) = \pi - 2$.

Inverse Trig Derivatives:

$$\frac{d}{dx} \sin^{-1}(x) =$$

$$\frac{d}{dx} \sec^{-1}(x) =$$

$$\frac{d}{dx} \tan^{-1}(x) =$$

7. $\int \frac{1}{\sqrt{1-x^2}} \, dx =$

8. $\int \frac{1}{|x|\sqrt{x^2-1}} \, dx$

9. **Separating rational functions**

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

10. **Combining expressions**

$$\int 3x(\sqrt{x} + x^2) \, dx$$

6.8 Indefinite Integrals

Practice

Calculus

Find the following indefinite integrals.

1. $\int \left(6^x - \frac{1}{x}\right) dx$

2. $\int \left(\frac{x^5-6}{x}\right) dx$

3. $\int (e^x + e^2) dx$

4. $\int 5^x dx$

5. $\int \frac{1}{x \cdot \sqrt[3]{x}} dx$

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

7. $\int \sqrt{t} \left(t - \frac{1}{t}\right) dt$

8. $\int \left(\frac{5x^2+x-2}{x}\right) dx$

9. $\int (x - 2\csc^2 x) dx$

10. $\int (x^2 + 2)^2 dx$

11. $\int (3 \csc x \cot x - 1) dx$

12. $\int \left(\frac{\sqrt{x}-x-5}{x}\right) dx$

13. $\int (5 - \sec^2 x) dx$

14. $\int (3 \sin x - \sqrt{x}) dx$

Find the function that satisfies the given conditions.

15. $h'(t) = 8t^3 + 5$ and $h(1) = -4$

16. $\frac{dy}{dx} = 2x + \sin x$ and $y(0) = 4$

17. $f''(x) = x^{-3/2}$ and $f'(4) = 2$ and $f(0) = 0$

18. $f''(x) = \sin x$ and $f'(0) = 1$ and $f(0) = 6$

6.8 Indefinite Integrals

Test Prep

The following problems are DEFINITE integrals, but use strategies that were covered in this lesson.

19. $\int_1^3 \frac{x+6}{x^2} dx$

(A) $-\frac{1}{3}$

(B) $\ln 3 + 4$

(C) $\ln 3$

(D) 3

(E) $\ln 3 - 8$

20. $\int_{-1}^1 \frac{4}{1+x^2} dx$

(A) 0

(B) π

(C) 1

(D) 2π

(E) 2