

What is an Integral?

Worksheet

The indefinite integral of x is $x dx = x^{(n+1)}/(n+1) + C$ (for $n \neq -1$). A definite integral from a to b gives the net area under the curve between those bounds.

$$\int_a^b f(x) dx = F(b) - F(a)$$

Questions

1. $\int x dx = ?$

- A) $x/5 + C$
- B) $4x + C$
- C) $x + C$
- D) $5x + C$

2. $\int x dx = ?$

- A) 1
- B) 0.5
- C) 2
- D) 0

3. Why do we add $+C$ in indefinite integrals?

- A) To make the answer bigger
- B) Because derivative of a constant is 0
- C) It's just convention
- D) To avoid negative answers

4. $\int (6x) dx = ?$

- A) $2x + C$
- B) $6x + C$
- C) $12x + C$
- D) $3x + C$

5. Find $\int x dx$.

6. Evaluate $\int x dx$.

7. Find $\int (4x + 3) dx$.

8. Define: What is an integral?

9. Define: Power rule for integration?

10. Define: What is a definite integral?

Answer Key

1. A) $\int x/5 + C - x dx = x/5 + C$ by the power rule.
2. B) $\int 0.5 - x dx = x/2$, evaluate 0 to 1: $1/2 - 0 = 0.5$.
3. B) Because derivative of a constant is 0 - Any constant vanishes upon differentiation, so it must be added back.
4. A) $\int 2x + C - 6x dx = 6x/3 = 2x + C$.
5. Apply power rule: $\int x dx = x^{(n+1)}/(n+1) + C$ $n=3$ $x/4 + C$
6. $\int x dx = x^2/2 + C$ Evaluate from 0 to 2: $(2^2/2) - (0^2/2) = 2 - 0 = 2$
7. Integrate term by term. $\int 4x dx = 2x^2$ $\int 3 dx = 3x$ Result: $2x^2 + 3x + C$
8. The accumulated area under a curve, or the reverse operation of differentiation.
9. $\int x dx = x^{(n+1)}/(n+1) + C$, for $n \neq -1$
10. An integral evaluated between two bounds a and b, giving a numeric net area.

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