SmartKalike

CBSE Class 12 · Maths

Integrals

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

Which is an antiderivative of $(3x + 5)/((x + 1)(x + 2))$?

(A) $2\log|x + 1| + \log|x + 2| + C$

(B) $\log|x + 1| + 2\log|x + 2| + C$

(C) $3\log|x + 1| + 5\log|x + 2| + C$

(D) $2\log|x + 1| - \log|x + 2| + C$

Answer

(A) $2\log|x + 1| + \log|x + 2| + C$ — Partial fraction decomposition gives coefficients 2 and 1.

Q2. 1.5 marks · Short answer

Evaluate $d/dx\,[\int(3x^2 + 2)\,dx]$.

Answer

$\int(3x^2 + 2)\,dx = x^3 + 2x + C$

$(d/dx)(x^3 + 2x + C) = 3x^2 + 2$

$\therefore\ d/dx\,[\int(3x^2 + 2)\,dx] = 3x^2 + 2$

Q3. 2 marks · Short answer

Using integration by parts, evaluate $\int x\,e^x\,dx$, taking $u = x$ and $dv = e^x\,dx$.

Answer

$\int x\,e^x\,dx = x\,e^x - \int e^x\,dx$

$= x\,e^x - e^x + C$

$\therefore\ \int x\,e^x\,dx = e^x(x - 1) + C$

Q4. 3 marks · Medium answer

Evaluate $\int\cos^2x\,dx$ using the identity $\cos 2x = 2\cos^2x - 1$.

Answer

$\cos 2x = 2\cos^2x - 1$

$\cos^2x = \tfrac{1}{2}(1 + \cos 2x)$

$\int\cos^2x\,dx = \tfrac{1}{2}\int(1 + \cos 2x)\,dx$

$= \tfrac{1}{2}(x + \tfrac{1}{2}\sin 2x) + C$

$\therefore\ \int\cos^2x\,dx = x/2 + \sin 2x/4 + C$

Q5. 3.5 marks · Long answer

Evaluate $\int_0^1 2x(x^2 + 1)^3\, dx$ by substitution. First work without limits, integrate in the new variable, substitute back, and then use the original limits.

Answer

Let $t = x^2 + 1$, so $dt = 2x\, dx$.
$\int 2x(x^2 + 1)^3\, dx = \int t^3\, dt$
$= t^4/4$
$= (x^2 + 1)^4/4$
$\int_0^1 2x(x^2 + 1)^3\, dx = [(x^2 + 1)^4/4]_0^1$
$= (2^4 - 1^4)/4$
$\therefore \int_0^1 2x(x^2 + 1)^3\, dx = 15/4$

Q6. 5 marks · Long answer

Evaluate $\int (3x + 4)/(x^2 + 2x + 5)\, dx$. Express the numerator as A times the derivative of the denominator plus B, determine A and B by equating coefficients, and then integrate using standard forms.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/integrals

Q7. 1 mark · Multiple choice

In the integral $\int 2x/(x^4 + 3x^2 + 2)\, dx$, which substitution converts the integrand and differential into a rational expression in y?

(A) $y = x^2$
(B) $y = x^3$
(C) $y = 1/x$
(D) $y = x^4$

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/integrals

Q8. 1.5 marks · Short answer

Evaluate $\int [d/dx\, (x^3 - 4x)]\, dx$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/integrals

Q9. 2 marks · Short answer

Evaluate $\int x \cos x\, dx$ by taking x as the first function and cos x as the second function. Show the integral involving the derivative of the first function that is subtracted.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/integrals

Q10. 3 marks · Medium answer

Evaluate $\int \sin^3 x\, dx$ using the identity $\sin 3x = 3\sin x - 4\sin^3 x$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/integrals



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