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Class- 12 Sub-.Maths

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10.

$$\int \left(\sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 dx$$

Solution:

We get,

$$= \int \left(x + \frac{1}{x} - 2 \right) dx$$

By taking the terms separately, we get,

$$= \int x dx + \int \frac{1}{x} dx - 2 \int 1 dx$$

Hence, we get,

$$= \frac{x^2}{2} + \log|x| - 2x + C$$

11.

$$\int \frac{x^3 + 5x^2 - 4}{x^2} dx$$

Solution:

We get,

$$= \int (x + 5 - 4x^{-2}) dx$$

By taking the terms separately, we get,

$$= \int x dx + 5 \int 1 dx - 4 \int x^{-2} dx$$

On further calculation, we obtain,

$$= \frac{x^2}{2} + 5x - 4 \left(\frac{x^{-1}}{-1} \right) + C$$

Hence, we get,

$$= \frac{x^2}{2} + 5x + \frac{4}{x} + C$$

12.

$$\int \frac{x^3 + 3x + 4}{\sqrt{x}} dx$$

Solution:

We get,

$$= \int \left(x^{\frac{5}{2}} + 3x^{\frac{1}{2}} + 4x^{-\frac{1}{2}} \right) dx$$

On further calculation, we get,

$$= \frac{x^{\frac{7}{2}}}{\frac{7}{2}} + \frac{3 \left(x^{\frac{3}{2}} \right)}{\frac{3}{2}} + \frac{4 \left(x^{\frac{1}{2}} \right)}{\frac{1}{2}} + C$$

So,

$$= \frac{2}{7} x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 8x^{\frac{1}{2}} + C$$

Hence,

$$= \frac{2}{7} x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 8\sqrt{x} + C$$

13.

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

Solution:

By dividing, we get,

$$= \int (x^2 + 1) dx$$

By taking the terms separately, we get,

$$= \int x^2 dx + \int 1 dx$$

Therefore, we obtain,

$$= \frac{x^3}{3} + x + C$$

14.

$$\int (1-x)\sqrt{x} dx$$

Solution:

We get,

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

On further calculation, we get,

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

So,

$$= \frac{x^{\frac{3}{2}}}{\frac{3}{2}} - \frac{x^{\frac{5}{2}}}{\frac{5}{2}} + C$$

Hence, we get,

$$= \frac{2}{3} x^{\frac{3}{2}} - \frac{2}{5} x^{\frac{5}{2}} + C$$

15.

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

Solution:

We get,

$$= \int \left(3x^{\frac{5}{2}} + 2x^{\frac{3}{2}} + 3x^{\frac{1}{2}} \right) dx$$

By taking the terms separately, we get,

$$= 3 \int x^{\frac{5}{2}} dx + 2 \int x^{\frac{3}{2}} dx + 3 \int x^{\frac{1}{2}} dx$$

On further calculation, we get

$$= 3 \left(\frac{x^{\frac{7}{2}}}{\frac{7}{2}} \right) + 2 \left(\frac{x^{\frac{5}{2}}}{\frac{5}{2}} \right) + 3 \left(\frac{x^{\frac{3}{2}}}{\frac{3}{2}} \right) + C$$

Therefore, we get,

$$= \frac{6}{7} x^{\frac{7}{2}} + \frac{4}{5} x^{\frac{5}{2}} + 2x^{\frac{3}{2}} + C$$

16.

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

Solution:

By taking the terms separately, we get,

$$= 2 \int x dx - 3 \int \cos x dx + \int e^x dx$$

On further calculation, we get,

$$= \frac{2x^2}{2} - 3(\sin x) + e^x + C$$

Hence, we get,

$$= x^2 - 3 \sin x + e^x + C$$

17.

$$\int (2x^2 - 3 \sin x + 5\sqrt{x}) dx$$

Solution: