

NCERT Solutions for Class-XII Maths

Chapter-7.6

NCERT Maths Class 12

1. $x \sin x$

1. Let $I = \int x \sin x dx$

Taking x as first function and $\sin x$ as second function and integrating by parts, we obtain

$$\begin{aligned} I &= x \int \sin x dx - \int \left\{ \left(\frac{d}{dx} x \right) \int \sin x dx \right\} dx \\ &= x(-\cos x) - \int 1 \cdot (-\cos x) dx \\ &= -x \cos x + \sin x + C \end{aligned}$$

2. $S \sin 3x$

2. Let $I = \int \sin 3x dx$

Now, integrating by parts, we get,

$$\begin{aligned} I &= x \int \sin 3x dx - \int \left\{ \left(\frac{d}{dx} x \right) \int \sin 3x dx \right\} dx \\ &= x \left(\frac{-\cos 3x}{3} \right) - \int 1 \cdot \left(\frac{-\cos 3x}{3} \right) dx \\ &= \frac{-x \cos 3x}{3} + \frac{1}{9} \sin 3x + C \end{aligned}$$

3. $x^2 e^x$

3. Let $I = \int x^2 e^x dx$

Taking x^2 as first function and e^x as second function and integrating by parts, we obtain

$$\begin{aligned} I &= x^2 \int e^x dx - \int \left\{ \left(\frac{d}{dx} x^2 \right) \int e^x dx \right\} dx \\ &= x^2 e^x - \int 2x \cdot e^x dx \\ &= x^2 e^x - 2 \int x \cdot e^x dx \end{aligned}$$

again integrating by parts, we obtain

$$\begin{aligned} &= x^2 e^x - 2 \left[x \int e^x dx - \int \left\{ \left(\frac{d}{dx} x \right) \cdot \int e^x dx \right\} dx \right] \\ &= x^2 e^x - 2 \left[x e^x - \int e^x dx \right] \end{aligned}$$

$$\begin{aligned}
&= x^2 e^x - 2[xe^x - e^x] \\
&= x^2 e^x - 2xe^x + 2e^x + C \\
&= e^x(x^2 - 2x + 2) + C
\end{aligned}$$

4. $x \log x$

4. Let $I = x \log x$

Now, integrating by parts, we get,

$$\begin{aligned}
I &= \log x \int x dx - \int \left\{ \left(\frac{d}{dx} \log x \right) \int x dx \right\} dx \\
&= \log x \left(\frac{x^2}{2} \right) - \int \frac{1}{x} \cdot \frac{x^2}{2} dx \\
&= \frac{x^2 \log x}{2} - \int \frac{x}{2} dx \\
&= \frac{x^2 \log x}{2} - \frac{x^2}{4} + C
\end{aligned}$$

5. $x \log 2x$

5. $I = \int x \log x dx$

Taking $\log 2x$ as first function and x as second function and integrating by parts, we obtain

$$\begin{aligned}
I &= \log 2x \int x dx - \int \left\{ \left(\frac{d}{dx} \log 2x \right) \int x dx \right\} dx \\
&= \log 2x \cdot \frac{x^2}{2} - \int \frac{1}{2x} \cdot \frac{x^2}{2} dx \\
&= \frac{x^2 \log 2x}{2} - \int \frac{x}{4} dx \\
&= \frac{x^2 \log 2x}{2} - \frac{x^2}{8} + C
\end{aligned}$$

6. $x^2 \log 2x$

6. Let $I = x^2 \log x$

Now, integrating by parts, we get,

$$I = \log x \int x^2 dx - \int \left\{ \left(\frac{d}{dx} \log x \right) \int x^2 dx \right\} dx$$

$$\begin{aligned}
&= \log x \left(\frac{x^3}{3} \right) - \int \frac{1}{x} \cdot \frac{x^3}{3} dx \\
&= \frac{x^3 \log x}{3} - \int \frac{x^2}{3} dx \\
&= \frac{x^3 \log x}{3} - \frac{x^3}{9} + C
\end{aligned}$$

7. $x \sin^{-1} x$

Let $I = \int x \sin^{-1} x dx$

Taking $\sin^{-1} x$ as first function and x as second function and integrating parts, we obtain

$$\begin{aligned}
I &= \sin^{-1} x \int x dx - \int \left\{ \left(\frac{d}{dx} \sin^{-1} \right) \int x dx \right\} dx \\
&= \sin^{-1} x \left(\frac{x^2}{2} \right) - \int \frac{1}{\sqrt{1-x^2}} \cdot \frac{x^2}{2} dx \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{1}{2} \int \frac{-x^2}{\sqrt{1-x^2}} dx \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{1}{2} \int \left\{ \frac{1-x^2}{\sqrt{1-x^2}} - \frac{1}{\sqrt{1-x^2}} \right\} dx \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{1}{2} \int \left\{ \frac{1-x^2}{\sqrt{1-x^2}} - \frac{1}{\sqrt{1-x^2}} \right\} dx \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{1}{2} \left\{ \int \sqrt{1-x^2} dx - \int \frac{1}{\sqrt{1-x^2}} dx \right\} \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{1}{2} \left\{ \frac{x}{2} \sqrt{1-x^2} + \frac{1}{2} \sin^{-1} x - \sin^{-1} x \right\} + C \\
&= \frac{x^2 \sin^{-1} x}{2} + \frac{x}{4} \sqrt{1-x^2} + \frac{1}{4} \sin^{-1} x - \frac{1}{2} \sin^{-1} x + C \\
&= \frac{1}{4} (2x^2 - 1) \sin^{-1} x + \frac{x}{4} \sqrt{1-x^2} + C
\end{aligned}$$

8. $x \tan^{-1} x$

8. Let $I = x \tan^{-1} x$

Now, integrating by parts, we get,

$$\begin{aligned}
I &= \tan^{-1} x \int x dx - \int \left\{ \left(\frac{d}{dx} \tan^{-1} x \right) \int x dx \right\} dx \\
&= \tan^{-1} x \cdot \frac{x^2}{2} - \int \frac{1}{1+x^2} \cdot \frac{x^2}{2} dx
\end{aligned}$$

$$\begin{aligned}
&= \frac{x^2 \tan^{-1} x}{2} - \frac{1}{2} \int \frac{x^2}{1+x^2} dx \\
&= \frac{x^2 \tan^{-1} x}{2} - \frac{1}{2} \int \left(\frac{x^2+1}{1+x^2} - \frac{1}{1+x^2} \right) dx \\
&= \frac{x^2 \tan^{-1} x}{2} - \frac{1}{2} \int \left(1 - \frac{1}{1+x^2} \right) dx \\
&= \frac{x^2 \tan^{-1} x}{2} - \frac{1}{2} (x - \tan^{-1} x) + C \\
&= \frac{x^2 \tan^{-1} x}{2} - \frac{x}{2} + \frac{1}{2} \tan^{-1} x + C
\end{aligned}$$

9. $x \cos^{-1} x$

9. Let $I = \int x \cos^{-1} x dx$

Taking \cos^{-1} as first function and x as second function and integrating by parts, we obtain

$$\begin{aligned}
I &= \cos^{-1} x \int x dx - \int \left\{ \left(\frac{d}{dx} \cos^{-1} x \right) \int x dx \right\} dx \\
&= \cos^{-1} x \frac{x^2}{2} - \int \frac{-1}{\sqrt{1-x^2}} \cdot \frac{x^2}{2} dx \\
&= \frac{x^2 \cos^{-1} x}{2} - \frac{1}{2} \int \left\{ \sqrt{1-x^2} + \left(\frac{-1}{\sqrt{1-x^2}} \right) \right\} dx \\
&= \frac{x^2 \cos^{-1} x}{2} - \frac{1}{2} \int \sqrt{1-x^2} dx - \frac{1}{2} \int \left(\frac{-1}{\sqrt{1-x^2}} \right) dx \\
&= \frac{x^2 \cos^{-1} x}{2} - \frac{1}{2} I_1 - \frac{1}{2} \cos^{-1} x \quad \dots(1)
\end{aligned}$$

Where, $I_1 = \int \sqrt{1-x^2} dx$

$$\Rightarrow I_1 = x\sqrt{1-x^2} - \int \frac{d}{dx} \sqrt{1-x^2} \int x dx$$

$$\Rightarrow I_1 = x\sqrt{1-x^2} - \int \frac{-2x}{2\sqrt{1-x^2}} \cdot x dx$$

$$\Rightarrow I_1 = x\sqrt{1-x^2} - \int \frac{-x^2}{\sqrt{1-x^2}} dx$$

$$\begin{aligned} \Rightarrow I_1 &= x\sqrt{1-x^2} - \int \frac{1-x^2-1}{\sqrt{1-x^2}} dx \\ \Rightarrow I_1 &= x\sqrt{1-x^2} - \left\{ \int \sqrt{1-x^2} dx + \int \frac{-dx}{\sqrt{1-x^2}} \right\} \\ \Rightarrow I_1 &= x\sqrt{1-x^2} - \{I_1 + \cos^{-1} x\} \\ \Rightarrow 2I_1 &= x\sqrt{1-x^2} - \cos^{-1} x \\ \therefore I_1 &= \frac{x}{2}\sqrt{1-x^2} - \frac{1}{2}\cos^{-1} x \end{aligned}$$

Substituting in (1), we obtain

$$\begin{aligned} I &= \frac{x \cos^{-1} x}{2} - \frac{1}{2} \left(\frac{x}{2}\sqrt{1-x^2} - \frac{1}{2}\cos^{-1} x \right) - \frac{1}{2}\cos^{-1} x \\ &= \frac{(2x^2-1)}{4}\cos^{-1} x - \frac{x}{4}\sqrt{1-x^2} + C \end{aligned}$$

10. $(\sin^{-1}x)^2$

10. Let $I = (\sin^{-1}x)^2$

Now, integrating by parts, we get,

$$\begin{aligned} I &= (\sin^{-1} x) \int 1 \cdot dx - \int \left\{ \left(\frac{d}{dx} (\sin^{-1} x)^2 \right) \cdot \int 1 \cdot dx \right\} dx \\ &= (\sin^{-1} x)^2 \cdot x - \int \frac{2 \sin^{-1} x}{\sqrt{1-x^2}} \cdot x dx \\ &= x (\sin^{-1} x)^2 + \int \sin^{-1} x \left(\frac{-2x}{\sqrt{1-x^2}} \right) dx \\ &= x (\sin^{-1} x)^2 + \left[\sin^{-1} x \int \left(\frac{-2x}{\sqrt{1-x^2}} \right) dx - \int \left\{ \left(\frac{d}{dx} \sin^{-1} x \right) \int \left(\frac{-2x}{\sqrt{1-x^2}} \right) dx \right\} dx \right] \\ &= x (\sin^{-1} x)^2 + \left[\sin^{-1} x \cdot 2\sqrt{1-x^2} - \int \frac{1}{\sqrt{1-x^2}} \cdot 2(\sqrt{1-x^2}) dx \right] \\ &= x (\sin^{-1} x)^2 + 2\sqrt{1-x^2} \sin^{-1} x - \int 2 dx \\ &= x (\sin^{-1} x)^2 + 2\sqrt{1-x^2} \sin^{-1} x - 2x + C \end{aligned}$$

11. $\frac{x \cos^{-1} x}{\sqrt{1-x^2}}$

11. Let $I = \int \frac{x \cos^{-1} x}{\sqrt{1-x^2}} dx$

$$I = \frac{-1}{2} \int \frac{-2x}{\sqrt{1-x^2}} \cdot \cos^{-1} x dx$$

Taking $\cos^{-1} x$ as first function and $\left(\frac{-2x}{\sqrt{1-x^2}}\right)$ as second function and integrating by parts, we obtain

$$\begin{aligned} I &= \frac{-1}{2} \left[\cos^{-1} x \int \frac{-2x}{\sqrt{1-x^2}} dx - \int \left\{ \left(\frac{d}{dx} \cos^{-1} x \right) \int \frac{-2x}{\sqrt{1-x^2}} dx \right\} dx \right] \\ &= \frac{-1}{2} \left[\cos^{-1} x \cdot 2\sqrt{1-x^2} - \int \frac{-1}{\sqrt{1-x^2}} \cdot 2\sqrt{1-x^2} dx \right] \\ &= \frac{-1}{2} \left[2\sqrt{1-x^2} \cos^{-1} x + \int 2 dx \right] \\ &= \frac{-1}{2} \left[2\sqrt{1-x^2} \cos^{-1} x + 2x \right] + C \\ &= - \left[\sqrt{1-x^2} \cos^{-1} x + x \right] + C \end{aligned}$$

12. $x \sec^2 x$

12. Let $I = x \sec^2 x$

Now, integrating by parts, we get,

$$\begin{aligned} I &= x \int \sec^2 x dx - \int \left\{ \left(\frac{d}{dx} x \right) \int \sec^2 x dx \right\} dx \\ &= x \tan x - \int 1 \cdot \tan x dx \\ &= x \tan x + \log |\cos x| + C \end{aligned}$$

13. $\tan^{-1} x$

13. Let $I = \int 1 \cdot \tan^{-1} x dx$

Taking $\tan^{-1} x$ as first function and 1 as second function and integrating by parts, we obtain

$$\begin{aligned} I &= \tan^{-1} x \int 1 dx - \int \left\{ \left(\frac{d}{dx} \tan^{-1} x \right) \int 1 \cdot dx \right\} dx \\ &= \tan^{-1} x \cdot x - \int \frac{1}{1+x^2} \cdot x dx \\ &= x \tan^{-1} x - \frac{1}{2} \int \frac{2x}{1+x^2} dx \\ &= x \tan^{-1} x - \frac{1}{2} \log |1+x^2| + C \\ &= x \tan^{-1} x - \frac{1}{2} \log(1+x^2) + C \end{aligned}$$

14. $x(\log x)^2$

14. Let $I = x(\log x)^2$

Integrating by parts, we get,

$$\begin{aligned} I &= \frac{x^2}{2}(\log x)^2 - \left[\log x \int x dx - \int \left\{ \left(\frac{d}{dx} \log x \right) \int x dx \right\} dx \right] \\ &= \frac{x^2}{2}(\log x)^2 - \left[\frac{x^2}{2} - \log x - \int \frac{1}{x} \cdot \frac{x^3}{2} dx \right] \\ &= \frac{x^2}{2}(\log x)^2 - \frac{x^2}{2} \log x + \frac{1}{2} \int x dx \\ &= \frac{x^2}{2}(\log x)^2 - \frac{x^2}{2} \log x + \frac{x^2}{4} + C \end{aligned}$$

15. $(x^2 + 1) \log x$

15. Let $I = \int (x^2 + 1) \log x dx = \int x^2 \log x dx + \int \log x dx$

Let $I = I_1 + I_2 \dots (1)$

Where, $I_1 = \int x^2 \log x dx$ and $I_2 = \int \log x dx$

$I_1 = \int x^2 \log x dx$

Taking $\log x$ as first function and x^2 as second function and integrating by parts, we obtain

$$I_1 = \log x - \int \left\{ \left(\frac{d}{dx} \log x \right) \int x^2 dx \right\} dx$$

$$= \log x \cdot \frac{x^3}{3} - \frac{1}{3} \left(\int x^2 dx \right)$$

$$= \frac{x^3}{3} \log x - \frac{x^3}{9} + C_1 \quad \dots(2)$$

$I_2 = \int \log x dx$

Taking $\log x$ as first function and 1 as second function and integrating by parts, we obtain

$$I_2 = \log x \int 1 dx - \int \left\{ \left(\frac{d}{dx} \log x \right) \int 1 dx \right\}$$

$$= \log x \cdot x - \int \frac{1}{x} \cdot x dx$$

$$= x \log x - \int 1 dx$$

$$= x \log x - x + C_2 \quad \dots(3)$$

Using equations (2) and (3) in (1), we obtain

$$\begin{aligned}
 I &= \frac{x^3}{3} \log x - \frac{x^3}{9} + C_1 + x \log x - x + C_2 \\
 &= \frac{x^3}{3} \log x - \frac{x^3}{9} + x \log x - x + (C_1 + C_2) \\
 &= \left(\frac{x^3}{3} + x \right) \log x - \frac{x^3}{9} - x + C
 \end{aligned}$$

16. $e^x (\sin x + \cos x)$

16. $I = \int e^x (\sin x + \cos x) dx$

Now, Let $\sin x = f(x) \Rightarrow f'(x) = \cos x$

We know that,

$$\int e^x \{f(x) + f'(x)\} dx = e^x f(x) + C$$

Thus,

$$\int e^x (\sin x + \cos x) dx = e^x \sin x + C$$

17. $\frac{xe^x}{(1+x)^2}$

17. Let $I = \int \frac{de^x}{(1+x)^2} dx = \int e^x \left\{ \frac{x}{(1+x)^2} \right\} dx$
 $= \int e^x \left\{ \frac{1+x-1}{(1+x)^2} \right\} dx$
 $= \int e^x \left\{ \frac{1}{1+x} - \frac{1}{(1+x)^2} \right\} dx$

Let $f(x) = \frac{1}{1+x}$ $f'(x) = \frac{-1}{(1+x)^2}$

$$\Rightarrow \int \frac{xe^x}{(1+x)^2} dx = \int e^x \{f(x) + f'(x)\} dx$$

It is known that, $\int e^x \{f(x) + f'(x)\} dx = e^x f(x) + C$

$$\therefore \int \frac{xe^x}{(1+x)^2} dx = \frac{e^x}{1+x} + C$$

18. $e^x \left(\frac{1 + \sin x}{1 + \cos x} \right)$

18. $e^x \left[\frac{1 + \sin x}{1 + \cos x} \right]$

$$\begin{aligned}
&= e^x \left(\frac{\sin^2 \frac{x}{2} \cos^2 \frac{x}{2} + 2 \sin \frac{x}{2} \cos \frac{x}{2}}{2 \cos^2 \frac{x}{2}} \right) \\
&= \frac{e^x \left(\sin \frac{x}{2} + \cos \frac{x}{2} \right)^2}{2 \cos^2 \frac{x}{2}} \\
&= \frac{1}{2} e^x \cdot \left(\frac{\sin \frac{x}{2} + \cos \frac{x}{2}}{\cos \frac{x}{2}} \right)^2 \\
&= \frac{1}{2} e^x \left(\tan \frac{x}{2} + 1 \right)^2 \\
&= \frac{1}{2} e^x \left[1 + \tan^2 \frac{x}{2} + 2 \tan \frac{x}{2} \right] \\
&= \frac{1}{2} e^x \left[\sec^2 \frac{x}{2} + 2 \tan \frac{x}{2} \right] \\
&\Rightarrow e^x \left[\frac{1 + \sin x}{1 + \cos x} \right] = \frac{1}{2} e^x \left[\sec^2 \frac{x}{2} + 2 \tan \frac{x}{2} \right]
\end{aligned}$$

Now,

$$\text{Let } \tan \frac{x}{2} = f(x) \Rightarrow f'(x) = \frac{1}{2} \sec^2 \frac{x}{2}$$

We know that,

$$\int e^x \{f(x) + f'(x)\} dx = e^x f(x) + C$$

Thus,

$$\int e^x \left[\frac{1 + \sin x}{1 + \cos x} \right] dx = e^x \tan \frac{x}{2} + C$$

19. $e^x \left(\frac{1}{x} - \frac{1}{x^2} \right)$

19. Let $I = \int e^x \left[\frac{1}{x} - \frac{1}{x^2} \right] dx$

Also, let $\frac{1}{x} = f(x)$ $f'(x) = \frac{-1}{x^2}$

It is known that, $\int e^x \{f(x) + f'(x)\} dx = e^x f(x) + C$

$$\therefore I = \frac{e^x}{x} + C$$

$$20. \frac{(x-3)e^x}{(x-1)^3}$$

$$20. \int e^x \left\{ \frac{(x-3)}{(x-1)^3} \right\} dx = \int e^x \left\{ \frac{x-1-2}{(x-1)^3} \right\} dx$$

$$= \int e^x \left\{ \frac{1}{(x-1)^2} - \frac{2}{(x-1)^3} \right\}$$

$$\text{Now, let } f(x) = \frac{1}{(x-1)^2}$$

$$\Rightarrow f'(x) = \frac{2}{(x-1)^3}$$

We know that,

$$\int e^x \{f(x) + f'(x)\} dx = e^x f(x) + C$$

Thus,

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

$$21. e^{2x} \sin x$$

$$21. \text{ Let } I = \int e^{2x} \sin x dx \dots(1)$$

Integrating by parts, we obtain

$$I = \sin x \int e^{2x} dx - \int \left\{ \left(\frac{d}{dx} \sin x \right) \int e^{2x} dx \right\} dx$$

$$\Rightarrow I = \sin x \cdot \frac{e^{2x}}{2} - \int \cos x \cdot \frac{e^{2x}}{2} dx$$

$$\Rightarrow I = \frac{e^{2x} \sin x}{2} - \frac{1}{2} \int e^{2x} \cos x dx$$

Again integrating by parts, we obtain

$$I = \frac{e^{2x} \cdot \sin x}{2} - \frac{1}{2} \left[\cos x \int e^{2x} dx - \int \left\{ \left(\frac{d}{dx} \cos x \right) \int e^{2x} dx \right\} dx \right]$$

$$\Rightarrow I = \frac{e^{2x} \sin x}{2} - \frac{1}{2} \left[\cos x \cdot \frac{e^{2x}}{2} - \int (-\sin x) \frac{e^{2x}}{2} dx \right]$$

$$\Rightarrow I = \frac{e^{2x} \cdot \sin x}{2} - \frac{1}{2} \left[\frac{e^{2x} \cos x}{2} + \frac{1}{2} \int e^{2x} \sin x dx \right]$$

$$\Rightarrow I = \frac{e^{2x} \sin x}{2} - \frac{e^{2x} \cos x}{4} - \frac{1}{4} I$$

[From (1)]

$$\begin{aligned} \Rightarrow 1 + \frac{1}{4}I &= \frac{e^{2x} \sin x}{2} - \frac{e^{2x} \cos x}{4} \\ \Rightarrow \frac{5}{4}I &= \frac{e^{2x} \sin x}{2} - \frac{e^{2x} \cos x}{4} \\ \Rightarrow I &= \frac{4}{5} \left[\frac{e^{2x} \sin x}{2} - \frac{e^{2x} \cos x}{4} \right] + C \\ \Rightarrow I &= \frac{e^{2x}}{5} [2 \sin x - \cos x] + C \end{aligned}$$

22. $\sin^{-1} \left(\frac{2x}{1+x^2} \right)$

22. Let $x = \tan \phi$
 $dx = \sec^2 \phi d\phi$

Thus,

$$\sin^{-1} \left(\frac{2x}{1+x^2} \right) = \sin^{-1} \left(\frac{2 \tan \theta}{1 + \tan^2 \theta} \right) = \sin^{-1} (\sin 2\theta) = 2\theta$$

$$\Rightarrow \int \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx = \int 2\theta d\theta = 2 \int \theta \cdot \sec^2 \theta d\theta$$

Integrating by parts, we get

$$2 \left[\theta \cdot \int \sec^2 \theta d\theta - \int \left\{ \left(\frac{d}{d\theta} \theta \right) \int \sec^2 \theta d\theta \right\} d\theta \right]$$

$$= 2 \left[\theta \cdot \tan \theta - \int \tan \theta d\theta \right]$$

$$= 2 \left[\phi \tan \phi + \log |\cos \phi| \right] + C$$

$$= 2 \left[x \tan^{-1} x + \log \left| \frac{1}{\sqrt{1+x^2}} \right| \right] + C$$

$$= 2x \tan^{-1} x + 2 \log (1+x^2)^{-\frac{1}{2}} + C$$

$$= 2x \tan^{-1} x + 2 \left[-\frac{1}{2} \log(1+x^2) \right] + C$$

$$= 2x \tan^{-1} x + \log(1+x^2) + C$$

23. $\int x^2 e^{x^3} dx$ equals

(a) $\frac{1}{3} e^{x^3} + C$

(b) $\frac{1}{3} e^{x^2} + C$

(c) $\frac{1}{2} e^{x^2} + C$

(d) $\frac{1}{3} e^{x^3} + C$

23. Let $I = \int x^2 e^{x^3} dx$

Also, let $x^3 = t$ so $3x^2 dx = dt$

$$\Rightarrow I = \frac{1}{3} \int e^t dt$$

$$= \frac{1}{3} (e^t) + C$$

$$= \frac{1}{3} e^{x^3} + C$$

24. $\int e^x \sec x (1 + \tan x) dx$ equals

(a) $e^x \cos x + C$ (b) $e^x \sec x + C$

(c) $e^x \sin x + C$ (d) $e^x \tan x + C$

24. $\int e^x \sec x (1 + \tan x) dx$

$$\text{Let } I = \int e^x \sec x (1 + \tan x) dx = \int e^x (\sec x + \sec x \tan x) dx$$

Also, let $\sec x = f(x)$

$$\Rightarrow \sec x \tan x = f'(x)$$

We know that, $\int e^x (f(x) + f'(x)) dx = e^x f(x) + C$

Thus, $I = e^x \sec x + C$

