



Indefinite Integrals Ex 19.2 Q47

We have,

$$f'(x) = 8x^3 - 2x$$

$$\Rightarrow f(x) = \int f'(x) dx = \int (8x^3 - 2x) dx$$

$$\begin{aligned}\Rightarrow f(x) &= \int (8x^3 - 2x) dx \\ &= \int 8x^3 dx - \int 2x dx \\ &= \frac{8x^4}{4} - \frac{2x^2}{2} + c \\ &= 2x^4 - x^2 + c\end{aligned}$$

$$\Rightarrow f(x) = 2x^4 - x^2 + c \quad \text{---(i)}$$

Since, $f(2) = 8$

$$\therefore f(2) = 2(2)^4 - (2)^2 + c = 8$$

$$\Rightarrow 32 - 4 + c = 8$$

$$\Rightarrow 28 + c = 8$$

$$\Rightarrow c = -20$$

Putting $c = -20$ in equation (i), we get

$$f(x) = 2x^4 - x^2 - 20$$

Hence, $f(x) = 2x^4 - x^2 - 20$.

Indefinite Integrals Ex 19.2 Q48

We have,

$$\begin{aligned}
 f(x) &= \int f'(x) dx \\
 \Rightarrow f(x) &= \int (a \sin x + b \cos x) dx \\
 &= -a \cos x + b \sin x + c \\
 \therefore f(x) &= -a \cos x + b \sin x + c \quad \text{--- (i)}
 \end{aligned}$$

Since,

$$\begin{aligned}
 f'(0) &= 4 \\
 \therefore f'(0) &= a \sin 0 + b \cos 0 = 4 \\
 \Rightarrow a \times 0 + b \times 1 &= 4 \\
 \Rightarrow b &= 4
 \end{aligned}$$

Now,

$$\begin{aligned}
 f(0) &= 3 \\
 \therefore f(0) &= -a \cos 0 + b \sin 0 + c = 3 \\
 \Rightarrow -a + 0 + c &= 3 \\
 \Rightarrow c - a &= 3 \quad \text{--- (ii)}
 \end{aligned}$$

$$\text{and, } f\left(\frac{\pi}{2}\right) = 5$$

$$\begin{aligned}
 \therefore f\left(\frac{\pi}{2}\right) &= -a \cos\left(\frac{\pi}{2}\right) + b \sin\left(\frac{\pi}{2}\right) + c = 5 \\
 \Rightarrow -a \times 0 + b \times 1 + c &= 5 \\
 \Rightarrow b + c &= 5 \\
 \Rightarrow 4 + c &= 5 \quad [\because b = 4] \\
 \Rightarrow c &= 5 - 4 \\
 \Rightarrow c &= 1
 \end{aligned}$$

Putting $c = 1$ in equation (ii), we get

$$\begin{aligned}
 1 - a &= 3 \\
 \Rightarrow -a &= 3 - 1 \\
 \Rightarrow -a &= 2 \\
 \Rightarrow a &= -2
 \end{aligned}$$

Putting $a = -2$, $b = 4$ and $c = 1$ in equation (i), we get

$$\begin{aligned}
 f(x) &= -(-2) \cos x + 4 \sin x + 1 \\
 \Rightarrow f(x) &= 2 \cos x + 4 \sin x + 1
 \end{aligned}$$

Hence, $f(x) = 2 \cos x + 4 \sin x + 1$

Indefinite Integrals Ex 19.2 Q49

We have,

$$\begin{aligned}
 f(x) &= \sqrt{x} + \frac{1}{\sqrt{x}} \\
 \Rightarrow \int f(x) &= \int \left(\sqrt{x} + \frac{1}{\sqrt{x}} \right) dx \\
 &= \int x^{\frac{1}{2}} dx + \int x^{-\frac{1}{2}} dx \\
 &= \frac{2}{3} x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c
 \end{aligned}$$

Hence, the primitive or anti-derivative of $f(x) = \frac{2}{3} x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c$.

***** END *****

