Nishant Jindal

$$\int \frac{x^2\left(1+\frac{1}{x^2}\right)^{5/2}dx}{x^3} = -\int \frac{t^6\,dt}{t^2-1}$$

$$1+\frac{1}{x^2}=t^2$$

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

$+1-1$

$$I = x^3\sqrt{x^2+1}-3\int \frac{x^4+x^2}{\sqrt{x^2+1}}\,dx$$

$$4I = x^3\sqrt{x^2+1}-3\left(\frac{x}{2}\sqrt{x^2+1}+\frac{1}{2}\ln\left|x+\sqrt{x^2+1}\right|\right)-3\ln\left|x+\sqrt{x^2+1}\right|+C.$$

Nishant Jindal

$$\int \frac{\sec^2 x\,dx}{\sqrt{\tan^2 x + 2}} + \int \frac{\cos x\,dx}{\sqrt{2 - \sin^2 x}}$$

$1 - 2^x = t$

$-2^x\,dx \quad dt$

$$\int \frac{t^4 - (t^4 - 1)\,dt}{(1-t)\,t^4}$$

$$\int \frac{x\,\tan^{-1} x\,dx}{(1+x^2)^2}$$

$$\int \frac{dx}{(1+x^2)^2}$$

$$\int \frac{(2+t)^2 (t-1)\,dt}{t^3}$$

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

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

Nishant Jindal

$$\int \underset{\mathrm{I}}{x}\, \underbrace{e^{\sin x} \cos x}_{\mathrm{II}}\, dx - \int e^{\sin x}\, \underbrace{\tan x \sec x}_{\mathrm{II}}\, dx$$

$$x e^{\sin x} - \cancel{\int e^{\sin x} dx} - \sec x\, e^{\sin x} + \cancel{\int e^{\sin x} \cos x \sec x\, dx}$$

2076-89

$\boxed{2161, 2174}$

Nishant Jindal

$f(x) = \text{const.}$ are neither increasing nor decreasing.