
Complete the following problems. Calculate the following integrals. You do not need to simplify. Show all work to receive full credit.

1. $\int x^4 - \frac{7}{x} + \sin x \, dx$

$$= \frac{1}{5}x^5 - 7 \ln |x| - \cos x + C$$

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

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

3. $\int \frac{x^3 + 3x + 7}{\sqrt{x}} \, dx$

$$\begin{aligned} &= \int \frac{x^3}{\sqrt{x}} + \frac{3x}{\sqrt{x}} + \frac{7}{\sqrt{x}} \, dx \\ &= \int x^{\frac{5}{2}} + 3\sqrt{x} + 7x^{-\frac{1}{2}} \, dx \\ &= \frac{2}{7}x^{\frac{7}{2}} + 3 \cdot \frac{2}{3}x^{\frac{3}{2}} + 14x^{\frac{1}{2}} + C \\ &= \frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 14x^{\frac{1}{2}} + C \end{aligned}$$

4. $\int \sin^2 x \, dx$

$$\begin{aligned} &= \int \frac{1 - \cos 2x}{2} \, dx \\ &= \int \frac{1}{2} - \frac{1}{2} \cos 2x \, dx \\ &= \frac{1}{2}x - \frac{1}{4} \sin 2x + C \end{aligned}$$