

Question 5: The value of $\int_1^e (\tan^{-1} x/x + \log x/(1+x^2)) dx$ is

- (a) $\tan e$
- (b) $\tan^{-1} e$
- (c) $\tan^{-1} 1/e$
- (d) none of these

Answer: b

Solution:

Integrating by parts.

Take $\tan^{-1} x$ as first function and $1/x$ as second function.

$$\begin{aligned}\int_1^e (\tan^{-1} x/x + \log x/(1+x^2)) dx &= [\tan^{-1} x \log x]_1^e - \int_1^e \log x/(1+x^2) dx + \int_1^e \log x/(1+x^2) dx \\ &= \tan^{-1} e\end{aligned}$$

Hence option b is the answer.