

STEP/Integration Q5 (21/6/23)

$$\int \tan x \, dx$$

Solution

(integrating to find substitution)

$$\int \tan x \, dx = \int \frac{\sin x}{\cos x} \, dx$$

Integrating $\sin x$ to give $-\cos x$ reveals that the substitution

$u = \cos x$ will work: $du = -\sin x \, dx$,

so that $I = -\int \frac{1}{u} \, du = -\ln u + c = -\ln(\cos x) + c = \ln(\sec x) + c$