

Quiz 3

Name: key

1. Evaluate the integrals:

[8] a) $\int x e^{10x} dx$ = $uv - \int v du = x \cdot \frac{1}{10} e^{10x} - \int \frac{1}{10} e^{10x} dx$

① $u = x$ $dv = e^{10x} dx$ ①
 ① $du = dx$ $v = \int e^{10x} dx = \frac{1}{10} e^{10x}$ ①

= $\frac{x}{10} e^{10x} - \frac{1}{10} \int e^{10x} dx$
 = $\frac{x}{10} e^{10x} - \frac{1}{10} \cdot \frac{1}{10} e^{10x} + C$

= $\boxed{\frac{x e^{10x}}{10} - \frac{e^{10x}}{100} + C}$

[6] b) $\int \sec^{10} x \tan x dx$

① $u = \sec x$
 ① $du = \sec x \tan x dx$

" $\int \sec^9 x \cdot \sec x \tan x dx$

= $\int u^9 du$

= $\frac{u^{10}}{10} + C = \boxed{\frac{\sec^{10} x}{10} + C}$

[6] c) $\int \frac{\sin x + 5}{\cos^2 x} dx = \int \frac{\sin x}{\cos^2 x} dx + \int \frac{5}{\cos^2 x} dx$

= $\int \frac{\sin x}{\cos^2 x} dx + 5 \int \sec^2 x dx$

① $u = \cos x$
 ① $du = -\sin x dx$ = $\int \frac{-du}{u^2} + 5 \int \sec^2 x dx$

= $-\int u^{-2} du + 5 \int \sec^2 x dx$ ①

= $-\frac{u^{-1}}{-1} + 5 \tan x + C = \boxed{\sec x + 5 \tan x + C}$