Name: Richard

MATH 201
February 22, 2024

1. $\displaystyle\int \tan^3(x)\sec^8(x)\,dx = \int \tan^2(x)\sec^7(x)\,\sec(x)\tan(x)\,dx$

$\boxed{\begin{array}{l} u = \sec(x) \\ du = \sec(x)\tan(x)\,dx \end{array}}$ $= \displaystyle\int (\sec^2(x)-1)\sec^7(x)\,\sec(x)\tan(x)\,dx$

$= \displaystyle\int (u^2-1)u^7\,du$

$= \displaystyle\int u^9 - u^7\,du$

$= \dfrac{u^{10}}{10} - \dfrac{u^8}{8} + C$

$= \boxed{\dfrac{\sec^{10}(x)}{10} - \dfrac{\sec^8(x)}{8} + C}$

Name: Richard

QUIZ 10 ◇

MATH 201
February 22, 2024

1. $\displaystyle\int \cos^3(x)\sin^6(x)\,dx = \int \cos^2(x)\sin^6(x)\,\cos(x)\,dx$

$\boxed{\begin{array}{l} u = \sin(x) \\ du = \cos(x)\,dx \end{array}}$ $= \displaystyle\int (1-\sin^2(x))\sin^6(x)\,\cos(x)\,dx$

$= \displaystyle\int (1-u^2)u^6\,du$

$= \displaystyle\int u^6 - u^8\,du = \dfrac{u^7}{7} - \dfrac{u^9}{9} + C$

$= \boxed{\dfrac{\sin^7(x)}{7} - \dfrac{\sin^9(x)}{9} + C}$

1. $\displaystyle \int \cos^5(x)\, dx = \int \cos^4(x) \cos(x)\, dx$

$$= \int \left(\cos^2(x)\right)^2 \cos(x)\, dx$$

$$= \int \left(1 - \sin^2(x)\right)^2 \cos(x)\, dx$$

$$\begin{cases} u = \sin(x) \\ du = \cos(x)\, dx \end{cases}$$

$$= \int \left(1 - u^2\right)^2 du$$

$$= \int 1 - 2u^2 + u^4\, du = u - \frac{2u^3}{3} + \frac{u^4}{4} + C$$

$$= \boxed{\sin(x) - \frac{2\sin^3(x)}{3} + \frac{\sin^4(x)}{4} + C}$$

1. $\displaystyle \int \tan^6(x) \sec^4(x)\, dx = \int \tan^6(x) \sec^2(x) \sec^2(x)\, dx$

$$\begin{cases} u = \tan(x) \\ du = \sec^2(x)\, dx \end{cases}$$

$$= \int \tan^6(x) \left(1 + \tan^2(x)\right) \sec^2(x)\, dx$$

$$= \int u^6 \left(1 + u^2\right) du$$

$$= \int u^6 + u^8\, du = \frac{u^7}{7} + \frac{u^9}{9} + C$$

$$= \boxed{\frac{\tan^7(x)}{7} + \frac{\tan^9(x)}{9} + C}$$