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$$\begin{aligned} 3. \int_0^{\pi/2} \sin^7 \theta \cos^5 \theta \, d\theta &= \int_0^{\pi/2} \sin^6 \theta \cos^4 \theta \cos \theta \, d\theta \\ &= \int_0^{\pi/2} \sin^6 \theta (1 - \sin^2 \theta)^2 \cos \theta \, d\theta \end{aligned}$$

$$\begin{aligned} u &= \sin \theta \\ du &= \cos \theta \, d\theta \end{aligned} \quad = \int_0^1 u^6 (1 - u^2)^2 \, du$$

$$\begin{aligned} u(0) &= \sin 0 = 0 \\ u(\pi/2) &= \sin \pi/2 = 1 \end{aligned} \quad \int_0^1 u^6 (1 - 2u^2 + u^4) \, du$$

$$\int_0^1 u^7 - 2u^9 + u^{10} \, du$$

$$\left[\frac{1}{8} u^8 - \frac{2}{10} u^{10} + \frac{1}{12} u^{12} \right]_0^1$$

$$\left(\frac{1}{8} - \frac{1}{5} + \frac{1}{12} \right) - (0) = \frac{1}{120}$$

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13. $\int \sqrt{\cos \theta} \sin^3 \theta d\theta$

$$\int \sqrt{\cos \theta} \sin^2 \theta \sin \theta d\theta$$

$$\int (\cos \theta)^{1/2} (1 - \cos^2 \theta) \sin \theta d\theta$$

$$u = \cos \theta$$

$$du = -\sin \theta d\theta$$

$$-du = \sin \theta d\theta$$

$$\left. \begin{aligned} & - \int u^{1/2} (1 - u^2) du \\ & - \int u^{1/2} - u^{5/2} du \\ & - \left(\frac{2}{3} u^{3/2} - \frac{2}{7} u^{7/2} \right) \end{aligned} \right\}$$

$$\frac{2}{7} u^{7/2} - \frac{2}{3} u^{3/2} + C$$