9 cont'd. $\frac{2}{5}\int_0^{\frac{\pi}{2}} \sin\theta \cos^2\theta \, d\theta = \frac{2}{5}\int_0^1 u^2 du = \frac{2}{15}$

$u = \cos\theta$

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

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

$-\frac{1}{2}\int_0^{\frac{\pi}{2}} \sin\theta \cos\theta \, d\theta = -\frac{1}{2}\int_0^1 v \, dv = -\frac{1}{4}$

$v = \sin\theta$

$dv = \cos\theta \, d\theta$

$\frac{2}{5}\int_0^{\frac{\pi}{2}} \sin^3\theta \, d\theta = \frac{1}{10}\int_0^{\frac{\pi}{2}} 4\sin^3\theta \, d\theta = \frac{1}{10}\int_0^{\frac{\pi}{2}} 3\sin\theta - \sin 3\theta \, d\theta$

$= \frac{1}{10}\left[-3\cos\theta + \frac{\cos 3\theta}{3}\right]_0^{\frac{\pi}{2}} =$

$\frac{1}{10}\left[3 + \frac{1}{3}\right] = \frac{10}{3}\left(\frac{1}{10}\right) = \frac{1}{3}$

$-\int_0^{\frac{\pi}{2}} \frac{2}{3}\sin\theta + \frac{1}{3}\cos\theta \, d\theta = -\left[-\frac{2}{3}\cos\theta + \frac{1}{3}\sin\theta\right]_0^{\frac{\pi}{2}} =$

$-\left[0 + \frac{1}{3} + \frac{2}{3} - 0\right] = -1$

$\frac{2}{15} - \frac{1}{4} + \frac{1}{3} - 1 = \frac{2}{15} + \frac{1}{3} - \frac{5}{4} = \frac{7}{15} - \frac{5}{4} = \frac{28-45}{40}$

$= \boxed{\frac{-17}{60}}$