PROOF OF FORMULA 3.625.2

$$\int_0^{\pi/4} \frac{\sin^{2n} x \, \cos^p 2x}{\cos^{2p+2n+2} x} \, dx = \frac{1}{2} B(n + 1/2, p + 1)$$

The change of variables $t = \tan x$ gives

$$\int_0^{\pi/4} \frac{\sin^{2n} x \, \cos^p 2x}{\cos^{2p+2n+2} x} \, dx = \int_0^1 t^{2n} (1 - t^2)^p \, dt.$$

The result now follows via $v = t^2$.