

### PROOF OF FORMULA 3.624.3

$$\int_0^{\pi/4} \frac{\cos^{n-1/2}(2x)}{(\cos x)^{2n+1}} dx = \frac{(2n-1)!!}{2(2n)!!} \pi$$

This is the special case  $\mu = n - \frac{1}{2}$  in entry 3.624.4 which states that

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

The expression

$$\Gamma\left(n + \frac{1}{2}\right) = \frac{\sqrt{\pi} (2n)!!}{2^{2n} n!}$$

is useful in the simplification.