ENTRIES IN PART 5

3.621.1 $$\int_0^{\pi/2} \sin^{\mu-1} x\,dx = \int_0^{\pi/2} \cos^{\mu-1} x\,dx = 2^{\mu-2} B\left(\frac{\mu}{2}, \frac{\mu}{2}\right)$$

3.621.3 $$\int_0^{\pi/2} \sin^{2m} x\,dx = \int_0^{\pi/2} \cos^{2m} x\,dx = \frac{(2m-1)!!}{(2m)!!}\frac{\pi}{2}$$

3.621.4 $$\int_0^{\pi/2} \sin^{2m+1} x\,dx = \int_0^{\pi/2} \cos^{2m+1} x\,dx = \frac{(2m)!!}{(2m+1)!!}$$

3.761.11 $$\int_0^{\pi/2} x^m \cos x\,dx = \sum_{k=0}^{m/2} \frac{(-1)^k m!}{(m-2k)!}\left(\frac{\pi}{2}\right)^{m-2k} + (-1)^{\lfloor m/2 \rfloor}\left(2\lfloor\frac{m}{2}\rfloor - m\right) m!$$

3.764.1 $$\int_0^{\infty} x^p \sin(ax+b)\,dx = \frac{1}{a^{p+1}}\Gamma(1+p)\cos\left(b + \frac{p\pi}{2}\right)$$

3.764.2 $$\int_0^{\infty} x^p \cos(ax+b)\,dx = -\frac{1}{a^{p+1}}\Gamma(1+p)\sin\left(b + \frac{p\pi}{2}\right)$$

3.821.3 – even $$\int_0^{\pi/2} x\cos^n x\,dx = \frac{\pi^2}{8}\frac{(n-1)!!}{n!!} - \frac{1}{2^{n-2}} \sum_{k=0,\, m-k \text{ odd}}^{m-1} \binom{n}{k}\frac{1}{(n-2k)^2} \quad n = 2m$$

3.821.3 – odd $$\int_0^{\pi/2} x\cos^n x\,dx = \frac{\pi}{2}\frac{(n-1)!!}{n!!} - \frac{1}{2^{n-1}} \sum_{k=0}^{m-1} \binom{n}{k}\frac{1}{(n-2k)^2} \quad n = 2m-1$$

3.821.14 $$\int_0^{\infty} x^{-1/2} \sin^{2n+1}(px)\,dx = \frac{1}{2^{2n}}\sqrt{\frac{\pi}{2p}} \sum_{k=0}^{n} (-1)^k \binom{2n+1}{n+k+1}\frac{1}{\sqrt{2k+1}}$$

3.822.1 $$\int_0^{\pi/2} x^p \cos^m x\,dx = -\frac{p(p-1)}{m^2}\int_0^{\pi/2} x^{p-2}\cos^m x\,dx + \frac{m-1}{m}\int_0^{\pi/2} x^p \cos^{m-2} x\,dx$$

3.822.2 $$\int_0^{\infty} x^{-1/2} \cos^{2n+1}(px)\,dx = \frac{1}{2^{2n}}\sqrt{\frac{\pi}{2p}} \sum_{k=0}^{n} \binom{2n+1}{n+k+1}\frac{1}{\sqrt{2k+1}}$$