

$$7. \quad \int_0^{\pi} x \cos(2m+1)x \, dx = 0 \quad \text{ГХ2 (332)(12a)}$$

$$8. \quad \int_0^{\pi} \sin^{\nu-1} x \cos ax \, dx = \frac{\pi \cos \frac{a\pi}{2}}{2^{\nu-1} \nu B\left(\frac{\nu+a+1}{2}, \frac{\nu-a+1}{2}\right)} \quad [Re \, \nu > 0] \quad \text{ЛБ V 121(68)и, Вт 337и}$$

$$9. \quad \int_0^{\pi/2} \sin^{\nu-1} x \cos ax \, dx = \frac{\pi}{2^{\nu} \nu B\left(\frac{\nu+a+1}{2}, \frac{\nu-a+1}{2}\right)} \quad [Re \, \nu > 0] \quad \text{ГХ2 (332)(9c)}$$

$$10. \quad \int_0^{\pi/2} \sin^{\nu-2} x \cos \nu x \, dx = \frac{1}{\nu-1} \sin \frac{\nu\pi}{2} \quad [Re \, \nu > 1] \quad \text{Х2 (332)(9c)}$$

$$11. \quad \int_0^{\pi} \sin^{\nu} x \cos \nu x \, dx = \frac{\pi}{2^{\nu}} \cos \frac{\nu\pi}{2} \quad [Re \, \nu > -1] \quad \text{ЛБ V 121(70)и}$$

$$12. \quad \int_0^{\pi} \sin^{2n} x \cos 2mx \, dx = 2 \int_0^{\pi/2} \sin^{2n} x \cos 2mx \, dx = \frac{(-1)^m}{2^{2n}} \binom{2n}{n-m} \pi \quad [n \geq m] \\ = 0 \quad [n < m] \quad \text{Би (40)(16), ГХ2 (332)(12b)}$$

$$13.^7 \quad \int_0^{\pi} \sin^{2n+1} x \cos 2mx \, dx = \\ = 2 \int_0^{\pi/2} \sin^{2n+1} x \cos 2mx \, dx = \frac{(-1)^m 2^{n+1} n! (2n+1)!!}{(2m-2n-3)!! (2m+2n+1)!!} \quad [n \leq m-1] \\ = \frac{(-1)^{n+1} 2^{n+1} n! (2m-2n+3)!! (2n+1)!!}{(2m+2n+1)!!} \quad [n < m-1] \\ \text{ГХ2 (332)(12c)}$$

$$14. \quad \int_0^{\pi/2} \cos^{\nu-2} x \sin \nu x \, dx = \frac{1}{\nu-1} \quad [Re \, \nu > 1] \quad \text{ГХ2 (332)(16c), Фх II 152}$$

$$15. \quad \int_0^{\pi} \cos^m x \sin nx \, dx = [1 - (-1)^{m+n}] \int_0^{\pi/2} \cos^m x \sin nx \, dx = \\ = [1 - (-1)^{m+n}] \left\{ \sum_{k=0}^{r-1} \frac{m!}{(m-k)!} \frac{(m+n-2k-2)!!}{(m+n)!!} + s \frac{m!(n-m-2)!!}{(m+n)!!} \right\} \\ \left[r = \begin{cases} m, & \text{если } m \leq n \\ n, & \text{если } m \geq n \end{cases}, \quad s = \begin{cases} 2, & \text{если } n-m = 4l+2 > 0 \\ 1, & \text{если } n-m = 2l+1 > 0 \\ 0, & \text{если } n-m = 4l \text{ или } n-m < 0 \end{cases} \right] \\ \text{ГХ2 (332)(13a)}$$

$$16. \quad \int_0^{\pi/2} \cos^n x \sin nx \, dx = \frac{1}{2^{n+1}} \sum_{k=1}^n \frac{2^k}{k} \quad \text{Фх II 153}$$