

$$\begin{aligned} \int_a^1 \left(1 - x^2\right)^{\frac{n-1}{2}} dx &= \int_a^1 \lim_{m \rightarrow \infty} f_m(x) dx = \lim_{m \rightarrow \infty} \int_a^1 f_m(x) dx \\ &= \lim_{m \rightarrow \infty} \int_a^{1 - \frac{1}{m}} \left(1 - x^2\right)^{\frac{n-1}{2}} dx. \end{aligned}$$