$$\int_a^1 \left(1-x^2\right)^{\frac{n-1}{2}}\,dx = \int_a^1 \lim_{m\to\infty} f_m\left(x\right)dx = \lim_{m\to\infty}\int_a^1 f_m\left(x\right)dx$$

$$= \lim_{m\to\infty}\int_a^{1-\frac{1}{m}} \left(1-x^2\right)^{\frac{n-1}{2}}\,dx.$$