Volume of the Great Pyramid

The Great Pyramid of Giza, if its limestone cladding were restored, would have a height of 146.6 meters and a square base 230.3 meters on a side. The edge of the square cross-section $y$ meters above the base is

$$230.3 - \frac{230.3y}{146.6}, \quad 0 \leq y \leq 146.6.$$ 

Thus the volume in cubic meters is

$$\int_0^{146.6} \left(230.3 - \frac{230.3y}{146.6}\right)^2 dy.$$ 

With the substitution $u = 230.3 - \frac{230.3y}{146.6}$ this becomes

$$\int_{230.3}^{0} u^2 \left(-\frac{146.6}{230.3} du\right) = \frac{146.6}{230.3} \int_{0}^{230.3} u^2 du = \frac{146.6 \cdot 230.3^3}{230.3 \cdot 3} \approx 2,591,795$$

cubic meters. (By the way, the density of granite—the principal material of the Great Pyramid—is 2750 kilograms per cubic meter.)