PROOF OF FORMULA 3.321.2

$$\int_0^a e^{-q^2x^2}\,dx = \frac{\sqrt{\pi}}{2q}\mathrm{erf}(aq)$$

The *error function* is defined by

$$\mathrm{erf}(u) := \frac{2}{\sqrt{\pi}}\int_0^u e^{-t^2}\,dt.$$

Let $t = qx$ to obtain

$$\int_0^a e^{-q^2x^2}\,dx = \frac{1}{q}\int_0^{aq} e^{-t^2}\,dt.$$

The integral has been evaluated.