PROOF OF FORMULA 3.323.1

$$\int_1^\infty e^{-qx-x^2}\,dx = \frac{\sqrt{\pi}}{2} e^{q^2/4}\left[1-\operatorname{erf}\left(1+\frac{q}{2}\right)\right]$$

Complete the square to obtain

$$-x^2 - qx = -(x+q/2)^2 + \frac{q^2}{4}.$$

The change of variables $t = x + q/2$ gives

$$\int_1^\infty e^{-qx-x^2}\,dx = e^{q^2/4}\int_{1+q/2}^\infty e^{-t^2}\,dt.$$

The result now follows from the representation

$$1-\operatorname{erf}(a) = \frac{2}{\sqrt{\pi}}\int_a^\infty e^{-t^2}\,dt.$$