PROOF OF FORMULA 3.361.3

$$\int_{-1}^{\infty} \frac{e^{-qx}}{\sqrt{1+x}}\, dx = e^{q} \sqrt{\frac{\pi}{q}}$$

Let $t = x + 1$ to obtain

$$\int_{-1}^{\infty} \frac{e^{-qx}}{\sqrt{x}}\, dx = e^{q} \int_{0}^{\infty} \frac{e^{-qt}}{\sqrt{t}}\, dt.$$

The change of variables $t = v/\sqrt{q}$ gives

$$\int_{0}^{\infty} \frac{e^{-qt}}{\sqrt{t}}\, dt = \frac{2}{\sqrt{q}} \int_{0}^{\infty} e^{-v^2}\, dv.$$

The result now follows from

$$\int_{0}^{\infty} e^{-v^2}\, dv = \frac{\sqrt{\pi}}{2}.$$