5. Expand the generating function for the Hermite polynomials to show that

$$\sum_{m,n=0}^{\infty} \frac{s^m\, t^n}{m!\, n!}\, H_m(x)\, H_n(x)\, e^{-x^2} = e^{-x^2+2x(s+t)-(s^2+t^2)}.$$

Integrate both sides over x and use the orthogonality of the Hermite polynomials to deduce their normalization.