

Feynman and Hibbs problem 5-3

Assume $f(x)$ is normalized, that is,

$$\int_{-\infty}^{\infty} f^*(x)f(x) dx = 1$$

Under this constraint, show that the state $f(x)$ which has the highest probability of having property G is $f(x) = g(x)$.

Consider equation (5.32).

$$P(G) = \left| \int_{-\infty}^{\infty} g^*(x)f(x) dx \right|^2 \quad (5.32)$$

If $f(x) = g(x)$ then

$$P(G) = \left| \int_{-\infty}^{\infty} f^*(x)f(x) dx \right|^2 = 1$$

which is the highest probability.