

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.