

Due Friday by 2:15pm

Points 50

Submitting a file upload

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Available Feb 12 at 1:25pm - Feb 12 at 2:15pm about 1 hour

Consider a real function $f(x) = A \exp\left(-\frac{x^2}{4\sigma^2}\right)$, where A, σ are positive parameters, x is the position variable, and $\int_{-\infty}^{+\infty} [f(x)]^2 dx = 1$. Show detailed steps leading to your results for parts (a) and (b) below.

(a) Find A in terms of σ . (10 points)

(b) Evaluate $g(k) = \int_{-\infty}^{+\infty} f(x) \exp(-ikx) dx$, where k is a real parameter. (25 points)

(c) What are the units of $\sigma, k, A, f(x), g(k)$ and why? (15 points)