Generate a sequence

$$x(n) = \alpha \cos \omega_1 n + \beta \cos \omega_2 n, \quad n = 0, 1, 2, ..., N$$

Select appropriate values of parameters. Add zero mean white Gaussian noise of variance σ to $x(n)$. Check the spectrum using N-point FFT as you vary σ and N.

Now split the sequence $x(n)$ into M subsequences of equal lengths. Compute individual FFTs of sequences and average them out over all such subsequences. How does this compare to the previous spectrum as you vary M.

Generate a new sequence $y(n)$ by multiplying $x(n)$ with a cosine window. Now compare the spectrum. Instead of using a window over the entire data sequence $x(n)$, use a window over each subsequence and then compare the results.

Repeat the above experiments for different values of $(\omega_1 - \omega_2)$ and (α, β). Give a proper interpretation of all results.