Test Question

1. Find the N-point DFT for $x(n)=n^2R_N(n)$

2. Find the N-point DFT for $x(n)=\cos\left(\frac{2\pi}{N}mn\right)$, where $0<m<N$

3. Suppose $X(k)$ is the N-point DFT of $x(n)$, let $h(n)=x((n)_N)R_{rN}(n)$, find the rN-point DFT of $h(n)$.

4. Suppose $X(k)$ is the N-point DFT of $x(n)$, let

$$y(n)=\begin{cases}x(n) & 0\le n\le N-1\\ 0 & N\le n\le rN-1\end{cases}$$

Find the rN-point DFT of $y(n)$.

5. Suppose $x_1(n)$ and $x_2(n)$ are real sequences of length N and $x(n)=\sum_{p=0}^{N-1}x_1(p)x_2((p+n)_N)$, find the N-point DFT of $x(n)$.