Homework 6

1) Problem 15B

2) Problem 15C

3) Problem 15F

4) Problem 15J

5) Let $0 < l < k < N$ with $d = k - l < \sqrt{N}$ and $rd \leq \sqrt{N}$ (modulo N). Let $|B| = \lfloor \sqrt{N}/\pi \rfloor$ where B is of the form $\{0, \pm d, \pm 2d \ldots, \}$. Prove that

$$\sum_{l=-|B|/2}^{|B|/2} |e^{-2\pi i l d r/N} - 1| \leq |B|/2.$$