

## 自主課題 6

$$\begin{aligned}
 \frac{1-d^2}{1-2d\cos x + d^2} &= \frac{\boxed{\phantom{00}}}{1-de^{ix}} + \frac{\boxed{\phantom{00}}}{1-de^{-ix}} \\
 &= 1 + \sum_{n=1}^{\infty} d^n e^{inx} + \sum_{n=1}^{\infty} d^n e^{-inx} \\
 &= 1 + \sum_{n=1}^{\infty} d^n (e^{inx} + e^{-inx}) \\
 &= 1 + \sum_{n=1}^{\infty} d^n \cdot \boxed{2} \cos nx
 \end{aligned}$$

$$\frac{1}{\pi} \int_{-\pi}^{\pi} \frac{1-d^2}{1-2d\cos x + d^2} \cos nx dx = \boxed{2\pi}$$

$$\therefore \frac{\boxed{\pi^2}}{(1-d^2)} = \int_0^\pi \frac{\cos nx}{1-2d\cos x + d^2} dx$$