Toeplitz Matrix

Given a large positive integer $n > 3$, create a matrix $A \in \mathbf{R}^{n \times n}$ such that

$$a_{ij} = \begin{cases} 2, & i = j, \\ (-0.5)^{|i-j|}, & i \neq j \end{cases}$$

For example, when $n = 4$:

$$A = \begin{pmatrix} 2 & -0.5 & 0.25 & -0.125 \\ -0.5 & 2 & -0.5 & 0.25 \\ 0.25 & -0.5 & 2 & -0.5 \\ -0.125 & 0.25 & -0.5 & 2 \end{pmatrix}$$

Input Format

A positive integer $n > 3$

Output Format

A $n \times n$ numpy array representing the matrix A as described above.

Constraints

- $4 \leq n \leq 3000$

Sample Input

```
n = 4
```

Sample Output

```
[[ 2.    -0.5    0.25  -0.125]
 [-0.5    2.    -0.5    0.25 ]
 [ 0.25  -0.5    2.    -0.5  ]
 [-0.125  0.25  -0.5    2.   ]]
```

Implementation

Goal: Fill in the following function:

```
def toeplitz_matrix(n):
    ...
    return ... # Return the resulting matrix
exec("\n".join(iter(input, "#Exit"))) # Don't remove this line
```