Question 1. (5 points)
Use the master theorem to solve the following recurrence

\[ T(n) = 5T(n/10) + O(\sqrt{n}) \]

\[ e = \frac{1}{2} < \log_{10} 5 = \log_b a \]
\[ \implies T(n) = O(n^{\log_{10} 5}) \]

Question 2. (5 points)
Multiply the following polynomials

\[ f(x) = x^2 - 2x + 1 \]
\[ g(x) = x^2 + 2 \]
\[ f.g = x^4 - 2x^3 + 3x^2 - 4x + 2 \]
Question 3. (5 points)
Do a BFS starting from 1 and write down the levels of the tree (no need to write the parents or draw edges between levels)

Level 0: 1
Level 1: 2
Level 2: 3, 5
Level 3: 6, 8
Level 4: 7, 9