1. What is the matrix belonging to a rotation in $\mathbb{R}^2$ over 45 degrees counterclockwise w.r.t. the canonical basis?

2. Same question for reflection in $x = y$.

3. Compute in two different ways the matrix belonging to the composition of the mappings from the previous two item items (i.e., first apply the mapping from the first item, and then the mapping from the second one).

4. What is the matrix belonging to differentiating polynomials of degree 2 w.r.t. the basis $\{1, x, x^2\}$?