Problem 1. Do Exercise 1 of class notes 7.

Problem 2. Show that if $\langle \cdot, \cdot \rangle$ is an inner product on $\mathbb{R}^n$, then there is a symmetric and positive definite matrix $A \in \mathbb{R}^{n \times n}$ satisfying
$$\langle x, y \rangle = (Ax, y), \text{ for all } x, y \in \mathbb{R}^n.$$ You must first define $A$ and then show that it is symmetric and positive definite. This is the converse of the second part of Problem 1 above.

Problem 3. Do Exercise 2 of class notes 7. You may assume without proof that if $B$ is symmetric and positive definite then so is $B^{-1}$ so you need only show that $BA$ is self adjoint in the $B^{-1}$ inner product.

Problem 4. Do Exercise 3 of class notes 7.

Problem 5. Let $A$ be an $n \times n$ matrix and set
$$G := (I + \alpha_1 A + \alpha_2 A^2).$$ Here $\alpha_1$ and $\alpha_2$ are parameters. Find the linear iterative method which has $G$ as a reducer.