## Math 54 Section 4: Quiz 8

Problem 1 (2 pts each) Give a 1-2 sentence explanation about why the following is true.
(a) Every positive definite matrix is invertible.
(b) A diagonal matrix with positive diagonal entries is positive definite.
(c) A symmettric matrix with a positive determinant might not be positive definite!

Problem $2(4 \mathrm{pts})$ Let $W \subset \mathbb{R}^{n}$ be a subspace and consider the linear map $\operatorname{proj}_{W}: \mathbb{R}^{n} \rightarrow \mathbb{R}^{n}$. Show that the matrix $A$ of $\operatorname{proj}_{W}$ is symmetric. Show that the quadratic form $q(x)=x \cdot(A x)$ is positive semi-definite.

Problem 3 (4 pts) What is the SVD $U \Sigma V^{T}$ of $A$ if $A$ has orthogonal columns $a_{1}, \ldots, a_{n}$ of length $c_{1}, \ldots, c_{n}$ ?

