Some True/False questions 4/9/2001 **Math 21b, O. Knill**

True	False	$A^5 = 1$, then every eigenvalue λ satisfies $\|\lambda\| = 1$.
True	False	If Q is orthogonal, then $\det(Q) = 1$.
True	False	The formula $\log(\|\det(A)\|) + \log(\|\det(B)\|) = \log(\|\det(AB)\|)$ holds.
True	False	In the QR decomposition of an upper triangular matrix, we have $Q = 1$.
True	False	If A is orthogonal, then $R = 1$, in the QR decomposition $A = QR$.
True	False	The composition of two upper triangular matrices is upper triangular.
True	False	$Av = 0$ with $v \neq 0 \Rightarrow$ exists 0 in diagonal of R of $A = QR$ decomposition.
True	False	A projection is orthogonal.
True	False	$\text{adj}(A) = A^T \Rightarrow A$ is orthogonal.
True	False	If A is invertible, then $A^{-1}A^T$ has determimant 1.
True	False	An eigenvector of A is in the image of A.
True	False	A rotation in four dimensions has a real eigenvector.
True	False	A dilation-rotation always has a real eigenvector.

True	False	$\det(A) = 1 \Rightarrow 1$ is an eigenvalue
True	False	The eigenvalues of a matrix determine the characteristic polynomial.
True	False	The characteristic polynomial of a matrix determines the eigenvectors.
True	False	The eigenvectors of A agree with the eigenvecttors of A^T.
True	False	$A = -A^T \Rightarrow \det(A^2 - (A^T)^2) = 0$.
True	False	A has origin as stable equilibrium $\Rightarrow A^{-1}$ has origin as unstable equilibrium.
True	False	Stability of dilation-rotation matrix A is determined by the determinant of A.
True	False	A shear is never stable.
True	False	The projection onto a linear space V is an orthogonal map.
True	False	Reflections at a linear space V have eigenvalues 1 or -1.
True	False	If a matrix has eigenvalues $1, 2, 3, 4, 5$, then $\det(A) = 5!$.
True	False	If a 2×2 matrix has zero trace, then all eigenvalues have the same length.
True	False	The least square soluton of $Ax = b$ is a solution of $Ax = b$.
True	False	An idempotent matrix satisfying $A^5 = 0$ has all eigenvalues equal to 0.
True	False	A shear has an eigenvalue 1.