Final Review Quiz MATH 304 Section 3 Name:

Clearly circle "True" or "False" for each of the following problems. Circle "True" only if the statement is always true. No explanation necessary.

TRUE FALSE (1) Given a subspace V of $\mathbb{R}^n$ a vector $\vec{b} \notin V$, the projection $\vec{p} = \text{proj}_V(\vec{b})$ is the vector in V which makes $||\vec{b} - \vec{p}||$ minimal.

TRUE FALSE (2) If S is a linearly dependent subset of the vector space V and $\vec{u} \notin \text{Span}(S)$, then $S \cup \{\vec{u}\}$ is linearly independent.

TRUE FALSE (3) If V is a finite dimensional vector space, then any spanning set contains a basis for V.

TRUE FALSE (4) If A is an 8×5 matrix of rank 5, then the linear transformation associated to A is one-to-one.

TRUE FALSE (5) If A is a square matrix, then A is invertible. must have full rank

TRUE FALSE (6) Suppose that V is a finite dimensional vector space with S a linearly independent subset of V and T a spanning set of V. Then S might contain more vectors than T.

TRUE FALSE (7) The set of polynomials $\{ax^3 + b : a, b \in \mathbb{R}\}$ is a subspace of $\mathbb{P}_3$. true if ≥ 4

TRUE FALSE (8) There exists a subset X of $\mathbb{R}^4$ that spans $\mathbb{R}^4$ [redacted] that has three elements.

TRUE FALSE (9) If U is a subspace of V and $F : V \to W$ is a ~~linear transformat~~ion, then $F(U)$ has the same dimension as U.

true if isomorphism

TRUE FALSE (10) Let $k > n$. The k dimensional vector space V can have a linearly independent set with n elements.

TRUE FALSE (11) Every nonzero subspace of $\mathbb{R}^n$ has an orthogonal basis.

TRUE FALSE (12) A square matrix always has eigenvalues and eigenvectors.

TRUE FALSE (13) The dimension of an eigenspace must be nonzero.

TRUE FALSE (14) For a subspace V of $\mathbb{R}^n$ with basis X, the orthogonal complement $V^\perp$ is computed using the column space of the matrix associat~~ed to~~ X. nul(X^T)

TRUE FALSE (15) If $F : V \to W$ and $G : W \to U$ are linear transformations whose composition, $GF : V \to U$ is 1-to-1 then ~~G~~ must be 1-to-1.

F