CS480 Quickie Quiz on Linear Algebra: Spring 1998

Name: ______________________________ **Score:** __________

1. We are given two non-zero vectors $\mathbf{u}, \mathbf{v} \in \Re^3$. Assume that the angle between $\mathbf{u}$ and $\mathbf{v}$ satisfies $0 < \theta < \pi$.

   Use dot products and/or cross products to give expressions for:

   - $\cos\theta$ ____________________
   - $\sin\theta$ ____________________
   - A vector perpendicular to both $\mathbf{u}$ and $\mathbf{v}$ ____________________

2. Which of the following are unit vectors? (Circle)

   $(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}, 0)$ $\quad$ $(1, -1, 0)$ $\quad$ $\frac{1}{5}(0, 3, 4)$ $\quad$ $(-1, 0, 0)$

3. Given a square matrix $\mathbf{A}$ whose columns form an orthonormal basis, **in general**

   - What is the determinant of $\mathbf{A}$?
   - What is the dot product of any pair of columns in $\mathbf{A}$?
   - What is the inverse of $\mathbf{A}$?

4. Given matrices $\mathbf{Q}$, $\mathbf{R}$, and $\mathbf{S}$, which statements are true **in general**? (Circle)

   $\mathbf{Q}(\mathbf{R} + \mathbf{S}) = \mathbf{QR} + \mathbf{QS}$

   $\mathbf{QR} = \mathbf{RQ}$

   $(\mathbf{QRS})^T = \mathbf{Q}^T\mathbf{R}^T\mathbf{S}^T$