Name: _____

WEEK 8 LINEAR ALGEBRA QUIZ
PSAM, Fall 2018

- This quiz is an opportunity for you to demonstrate your personal understanding of program material. No collaboration is allowed.
- This quiz is closed-book and closed-notes, except that you may use your personally prepared 3 inch by 5 inch notecard. You may also use a calculator.
- **Show your work** and explain your reasoning; you'll be evaluated on the clarity of your work and the completeness (and correctness) of your solutions.
- You have 30 minutes to work this quiz. Please work in the space provided; use the backs of the pages if you need more room. If you have a question, please ask it!

1. Suppose A is an $m \times n$ matrix. Explain why every vector in the column space of A must be orthogonal to every vector in the left nullspace of A.

2. (a) Find the projection of the vector $\mathbf{b} = (1, 2, 3)$ onto the line through $\mathbf{a} = (2, -1, 1)$.

(b) Use your answer to part (a) to find an orthogonal basis for the span of $\{(1, 2, 3), (2, -1, 1)\}$.

3. Find the determinant of the matrix $A = \begin{bmatrix} 2 & -1 & 0 & -3 \\ 1 & 3 & 0 & -2 \\ 0 & -2 & 2 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix}$.

4. $A = \begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix}$.

   (a) Find the eigenvalues of A.

   (b) Find eigenvectors corresponding to the eigenvalues you found in part (a).