Quiz 8, Math. 415, **Friday, July 17th, 2009**

Explain your answers carefully. Write complete sentences, not just formulas.

1 Let A, B be 3×3 matrices, with $\mathrm{Det}(A) = 5, \mathrm{Det}(B) = 4$.

a. (5 points) Calculate $\mathrm{Det}(2A)$.

b. (5 points) Calculate $\mathrm{Det}(A^{-1})$.

c. (5 points) Calculate $\mathrm{Det}(A^t B)$.

2. (5 points) Calculate Det $\begin{pmatrix} 3 & 3 & 4 \\ 6 & 8 & 7 \\ -3 & 5 & -9 \end{pmatrix}$.

3. (5 points) Calculate Det $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$.

4 (5 points) Find the area of the triangle with vertices $(0, 0)$, $(1, 3)$, $(5, 1)$.

5 (7 points) Find the eigenvalues and eigenvectors of $A = \begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix}$. Is A diagonalizable? If so, give the diagonalization, otherwise explain.

6 (8 points) Solve

$$\frac{d\mathbf{u}}{dt} = A\mathbf{u}, \quad u(0) = \begin{pmatrix} 3 \\ 3 \end{pmatrix}, \quad \text{for } A = \begin{pmatrix} 1 & 1 \\ 0 & 3 \end{pmatrix}$$