ASU ID:

Name:

CSE 355 October 6, 2008

G. Farin

Mock Midterm

In the following, we will use matrices

$$A = \begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} -1 & 1 \\ 2 & 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 0 & -2 \\ 2 & 1 & -1 \end{bmatrix}$$

and vectors

$$\mathbf{v} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \mathbf{u} = \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}.$$

1. Find $A\mathbf{v}$.

2. Find $\|\mathbf{u}\|$.

3. Consider the linear system $C\mathbf{x} = \mathbf{u}$. Perform one step of Gauss elimination.

4. Which of the matrices A, B, C is diagonally dominant? (And why?)

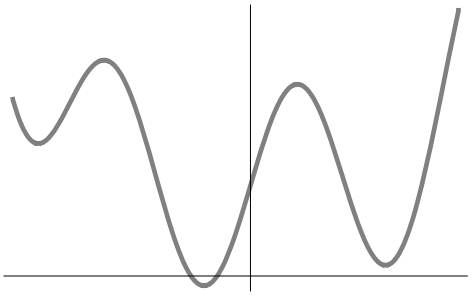
5. Is $\mathbf{v}$ an eigenvector of A or B? (Explain)

6. Let a triangle be given by three points

$$\mathbf{p}_1 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \mathbf{p}_2 = \begin{bmatrix} 4 \\ 0 \end{bmatrix}, \mathbf{p}_1 = \begin{bmatrix} 2 \\ 6 \end{bmatrix}.$$

What are the x, y-coordinates of the point with barycentric coordinates $(0, \frac{1}{2}, \frac{1}{2})$?

8. For the shown function, sketch in its derivative function.



9. What is the dimension of the space of all quadratic polynomials?