Answer the questions below. You may answer in the space provided. You may use the back or a separate sheet of paper if you need more space. You are to work in groups of no more than four people. Make sure to enter the names of your groupmates below.

Name: _____

Section: _____

Group Members: _____

1. Let $f(\mathbf{x}) = \mathbf{x}^T A \mathbf{x}$ be a quadratic form on $\mathbb{R}^3$ where

$$f\left(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}\right) = -x_1^2 + x_2^2 + x_3^2 + 2x_2 x_3.$$

(a) (1 point) What is the matrix A for the quadratic form $f(\mathbf{x})$?

(b) (3 points) Find an equivalent quadratic form $g(\mathbf{y})$ without cross terms.

(c) (3 points) Find a change of variable used to go from $f(\mathbf{x})$ to $g(\mathbf{y})$.

2. (3 points) Determine the definiteness of the matrix

$$B = \begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 2 \\ 2 & 2 & 0 \end{bmatrix}.$$