1. Section 13.1: For the functions given in the following problems, find and classify all critical points and determine which (if any) are global extrema: 3, 4, 8, 17

2. Section 13.2: 3, 6, 8, 11

3. Show

\[ \lim_{{(x,y) \to \infty}} xye^{-\left(x^2+y^2\right)} = 0. \]

You do not need to give an \( \epsilon - \delta \) proof. You can use L’Hopital’s rule from 1-variable calculus.

4. Let

\[ M = \begin{bmatrix} A & B \\ B & C \end{bmatrix} \]

be a symmetric \( 2 \times 2 \) matrix.

(a) Show that \( M \) is positive definite if and only if \( B^2 - AC < 0 \) and \( A > 0 \).

(b) Show that \( M \) is indefinite if and only if \( B^2 - AC > 0 \).

Recall in class that we effectively proved the “if” parts assuming \( A \neq 0 \).