Problem 1. Find the optimal agreement and a corresponding threat strategies of the following cooperative T.U. games:

\[
\begin{array}{cccc}
(1,2) & (0,1) & (8,0) & (3,6) \\
(5,5) & (3,0) & (1,1) & (0,3) \\
(1,1) & (0,4) & (2,1) & (1,3) \\
(2,0) & (4,2) & (3,0) & (5,1) \\
\end{array}
\quad
\begin{array}{cccc}
(5,2) & (2,1) & (1,1) & (0,0) \\
(0,0) & (0,5) & (2,0) & (3,1) \\
(3,0) & (1,5) & (1,5) & (2,2) \\
\end{array}
\]

Problem 2. Suppose the feasible outcome set of a cooperative NTU game is the quadrangle with corners \((0,0), (7,0), (6,1), (0,4)\).
(a) Find the Nash bargaining solution if the disagreement point is \((0,0)\).
(b) Find the Nash bargaining solution if the disagreement point is \((3,0)\).

Problem 3. Find the Nash solution of a cooperative NTU game with feasible outcome set \(\{(u, v) : u^2 + 4v^2 \leq 1\}\) with disagreement point \((0,0)\).

Problem 4. We consider the NTU cooperative game

\[
A, B = \begin{bmatrix}
(4,0) & (2,4) \\
(0,6) & (0,0)
\end{bmatrix}
\]

(a) Draw the set of feasible outcomes.
(b) Partition this into three sets \(A, B, C\), so that if the disagreement point is \(A\) the Nash bargaining outcome is the point \((2, 4)\), if the point is in \(B\) it is on the segment \((2, 4) - (4,0)\) and if in \(C\) it is on the segment \((2, 4) - (0,6)\). (c) Show that player 1 has a threat strategy that forces the outcome to be in \((2, 4) - (4,0)\)
(d) Show that player 2 has a threat strategy that forces the outcome to be \((2, 4)\).
Conclusion: the outcome of this NTU game will be \((2, 4)\).
(e) What is the outcome as a TU cooperative game?