Definitions

For this section to help you with the midterm, you should write down the exact definitions without looking them up. Then look them up on my blog and fix your answers. And remember: a definition is a precise thing. If you get it ‘almost right’, it’s like a doctor removing your gall bladder because it looks almost like your appendix.

1. Define a 2-player normal-form game.

2. Define a Nash equilibrium for a 2-player normal-form game.

3. Define what it means for some choice \( i \) for player A in a 2-player normal-form game to dominate choice \( i' \).

4. Define a dominant choice for player B in a 2-player normal-form game.

Proofs

5. Suppose \( A \) and \( B \) are the payoff matrices for 2-player normal-form game. Prove that if choice \( i \) for player A dominates choice \( i' \), and choice \( i' \) dominates choice \( i'' \), then choice \( i \) dominates choice \( i'' \). (We summarize this by saying domination is a transitive relation.)

2-Player normal form games

6. Fill in numbers in this 2-player normal-form game so that the only Nash equilibria are those with boxes around them:

\[
\begin{array}{ccc}
( & , & -1) & (-4, & ) & (2, & 1) \\
(1, & -1) & ( & , & 2) & (4, & 2) \\
( & , & 0) & (2, & ) & (4, & ) \\
\end{array}
\]

Probabilities

As usual, I don’t want decimals for the answers here.

7. Suppose you draw 3 cards from a well-shuffled deck. What is the probability that one is a king and the other two are queens?

8. Suppose you flip 4 fair coins. What is the probability that at least 2 land heads up?

Expected values

9. Suppose you roll a fair 6-sided die three times. Suppose you win $18 if you roll a 6 every time, and lose $1 otherwise. What is your expected payoff?

10. Suppose you flip two fair coins. Suppose you win $100 if you get two heads, $10 if you get one head, and nothing if you get no heads. What is your expected payoff?