COMP3121 Homework 5

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1 Question 1

- If B choose L, A will choose D; if B choose R, A will choose U, so A does not have dominant strategy. If A choose U, B will choose L; if A choose D, B will choose R, so B also does not have dominant strategy.
- Therefore, statement 1 is correct. Neither player A nor player B has a dominant strategy. The other three are false.

2 Question 2

- Need more external information to make decisions
- When there are multiple Nash Equilibrium, more information should be offered to predict their actions. They may have other indicators influence the result and all the players may try different ways to achieve the Nash Equilibrium.

3 Question 3

- Statement 1, 3, and 5 are correct.
- For pure strategy,

  if B choose L, A will choose D;

  if B choose R, A will choose U;

  if A choose U, A will choose R;

  if A choose D, A will choose L;

  Therefore, (D, L) and (U, R) are two Nash Equilibrium. Statement 1 and 3 are correct.
- For mixed strategy, suppose A chooses U with probability of p, and B chooses L with probability of q.

  A choose U will get 4 - 3q.

A choose D will get 4 - 3q.

4 - 3q = 4 - 3q, then q = $\frac{1}{2}$.

B choose L will get 3 - 2q.

B choose R will get 2.

3 - 2q = 2, then p = $\frac{1}{2}$.

Therefore, ($\frac{1}{2}$, $\frac{1}{2}$) is the Nash Equilibrium. Statement 5 is correct.

4 Question 4

- For mixed strategy, suppose A chooses U with probability of p, and B chooses L with probability of q.

  A choose U will get 5q + 0 = 5q.

  A choose D will get 4q + 2(1-q) = 2q + 2.

  5q = 2q + 2, then q = $\frac{2}{3}$.

  B choose L will get 6p + 4(1-p) = 4 + 2p.

  B choose R will get 10p + 2(1-p) = 2 + 8p.

  4 + 2p = 2 + 8p, then p = $\frac{1}{3}$.

- Therefore, ($\frac{1}{3}$, $\frac{2}{3}$) is the Nash Equilibrium.

5 Question 5

- There exists Nash equilibrium and there exists Nash equilibrium using weak dominant strategy.

- If A choose U, B will choose L or R.

  If A choose D, B will choose R.

  If B choose L, A will choose U.

  If B choose R, A will choose D.

  Therefore, (U, L) and (D, R) are two Nash Equilibrium.

- For player A, there is no dominant strategy. For player B, choosing R is one weak dominant strategy. Therefore, (D, R) is Nash Equilibrium using weak dominant strategy.