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Exercises 3
CS409 Algorithmic Game Theory
Term 2, 2018/2019

1. Give a Nash equilibrium for the following extension of a Rock-Paper-Scissors game and justify your answer.

I \ II	Rock	Paper	Scissors	Well
Rock	0 0	1 -1	-1 1	1 -1
Paper	-1 1	0 0	1 -1	-1 1
Scissors	1 -1	-1 1	0 0	1 -1
Well	-1 1	1 -1	-1 1	0 0

2. Show that for any real numbers a, b, c, d, and e, the two-player zero-sum game with payoff matrix

$$A = \begin{pmatrix} a & a & b & b \\ c & d & c & d \\ c & e & c & e \end{pmatrix}$$

has a pure Nash equilibrium.

3. Find all Nash equilibria of the game Chicken.

I \ II	swerve	straight
swerve	0 0	1 -1
straight	-1 1	-10 -10

4. Suppose player I sabotages her own car by disabling her airbag. A collision is now much worse for player I and we obtain the following modified game of Chicken.

I \ II	swerve	straight
swerve	0 0	1 -1
straight	-1 1	-10 -25

Find all Nash equilibria of this game.