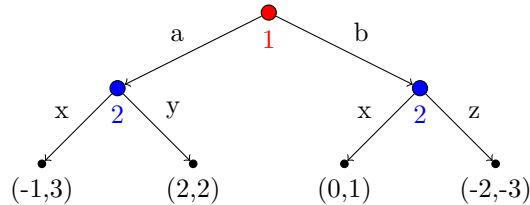# IA168 — Problem set 2

Throughout this problem set, "game" means "two-player perfect-information extensive-form game with pure strategies only", unless stated otherwise.

## Problem 1 [5 points]

Consider the game depicted below:

a) Give a formal description of this game as an *extensive-form game*.

b) Give a description of this game as a *strategic-form game* (formal definition or table).

Problem 2 [7 points]

Consider this real-life situation: Bob tells his wife Alice: "If you are ever unfaithful to me, I will kill you." Then, Alice decides to be either **f**aithful or **u**nfaithful. If she is unfaithful, Bob eventually finds it out and either keeps **q**uiet or really **k**ills her and then, with probability p, is proved guilty and put in prison.

We model this scenario as the game depicted below:
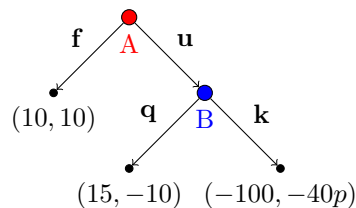
In dependence on the parameter p, $0 \leq p \leq 1$, list all:

a) never-best-response strategies;

b) maxmin strategies;

c) Nash equilibria;

d) subgame-perfect equilibria.

Problem 3 [8 points]

Find a game where all of the following conditions are satisfied:

- there is a strategy profile whose outcome is for both players better than that of any Nash equilibrium;

- there is a Nash equilibrium whose outcome is for both players better than that of any subgame-perfect equilibrium;

- there are exactly two subgame-perfect equilibria s, s', and the outcome of s is for both players better than that of s'.

Should you fail to find such a game, try your best (for partial points) to find a game which matches the requirements as closely as you can.