PRACTICE FIRST MIDTERM: ANSWERS

1. **(a)** 10 is not strictly dominated for Player 1 (if Player 2 writes 90, then writing 10 gives Player 1 a payoff of 10, while every other strategy gives him 0).

(b) Player 1 does not have strictly dominated strategies.

(c) Yes, 100 is weakly dominated (for example by 10). In fact, writing 100 gives Player 1 a payoff of 0 in every possible case, while writing, say 10, would give him 10 in some cases and 0 in others.

(d) The only weakly dominated strategy is 100.

(e) The Nash equilibria are all and only the pairs (x,y) such that x + y = 100, as well as the pair (100,100).

2. **(a)** M is a weakly dominant strategy for player 1.

(b) Player 2 does not have a dominant strategy.

(c) Hence, by (b), there is no dominant strategy equilibrium.

(d) In the first step delete T and B for Player 1 and R for Player 2 (strictly dominated by C). In the second step delete L for Player 2. Thus the output of the IDWDS is the strategy profile (M,C).

3. **(a)** $(1,72) \succ_1 (2,35) \sim_1 (2,60)$.

(b) $(2,46) \succ_1 (2,57) \succ_1 (1,73)$.

(c) $(1,18) \succ_1 (2,50) \succ_1 (2,39)$.

(d) This is the case where bidding the true value is a dominant strategy: $b_1 = v_1$ is weakly dominant.

(e) Recall that $p_1 < v_1 < p_m$. Bidding v_1 is not a dominant strategy: if Player 2 bids p_m then with v_1 the outcome is $(2, v_1)$ and Player 1 would prefer bidding p_1, since – by benevolence – $(2, p_1) \succ_1 (2, v_1)$.

(f) The assumption is that it is common knowledge that both players are selfish and **uncaring** and $B = \{1, 2, 3 = v_1, 4, 5 = v_2\}$. Since bidding one's own true value is a weakly dominant strategy, (3,5) is a Nash equilibrium; however, it is not the only Nash equilibrium. All of the following are Nash equilibria: (1,5), (2,5), (3,5), (4,5), (1,4), (2,4), (3,4), (1,3), (2,3), (5,1), (5,2) and (5,3). Thus, a total of 12 equilibria.

(g) The assumption is that it is common knowledge that both players are selfish and **benevolent** and $B = \{1, 2, 3 = v_1, 4, 5 = v_2\}$.

(g.1) (3,5) is not a Nash equilibrium because the associated outcome is (2,3); by benevolence, $(2,1) \succ_1 (2,3)$ and Player 1 can induce outcome $(2,1)$ by reducing her bid from 3 to 1.

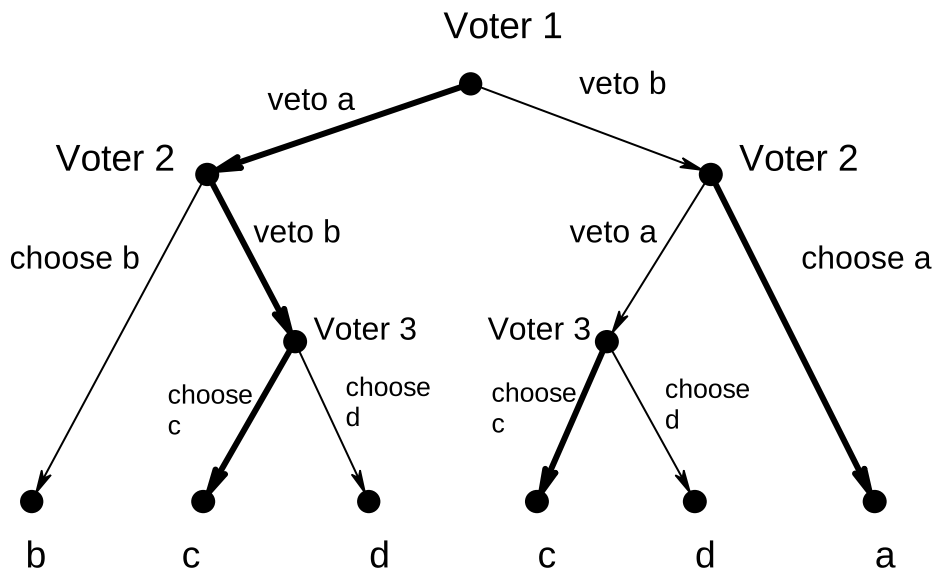
(g.2) The Nash equilibria are (1,3), (1,4), (1,5) and (5,1).

(h) The assumption is that it is common knowledge that both players are selfish and **spiteful** and $B = \{1, 2, 3 = v_1, 4, 5 = v_2\}$.

(h.1) (3,5) is not a Nash equilibrium because the associated outcome is (2,3); by spitefulness, $(2,4) \succ_1 (2,3)$ and Player 1 can induce outcome $(2,4)$ by increasing her bid from 3 to 4.

(h.2) The Nash equilibria are: (4,5), (3,4), (2,3).

4. **(a)**



(b) 1’s strategies are: (1) veto a, (2) veto b.

(c) 2’s strategies are: (1) choose b if 1 vetoed a and choose a if 1 vetoed b, (2) veto b if 1 vetoed a and choose a if 1 vetoed b, (3) choose b if 1 vetoed a and veto a if 1 vetoed b, (4) veto b if 1 vetoed a and veto a if 1 vetoed b.

(d) 3’s strategies are: (1) choose c if 1 vetoed a and 2 vetoed b and choose d if 1 vetoed b and 2 vetoed a, (2) choose d if 1 vetoed a and 2 vetoed b and choose c if 1 vetoed b and 2 vetoed a, (3) choose c always, (4) choose d always.

(e) The backward induction equilibrium of the first game is shown by thick arrows: Voter 1’s strategy: veto a. Voter 2’s strategy: veto b if Voter 1 vetoes a, choose a if Voter 1 vetoes b. Voter 3’s strategy: choose c in every case. The outcome is that candidate c is chosen.

(f) 1’s strategy: veto b; 2’s strategy: choose b if 1 vetoes a, choose a if 1 vetoes b;
3’s strategy: choose c in every case. The outcome is that candidate a is chosen.
This Nash equilibrium relies on Player 2’s strategy to choose b if 1 vetoes a, which is not a credible strategy.