Q1.

a) Pure strategy NE: (C, c)

b) Suppose there is a SPNE in which (A, a) is played in Period 1.

By SPNE, players must play a NE in period 2. So, (C, c) is played in every history at period 2.

Given this if Player 1 plays A in Period 1, Player 2's best response is play b (and not a).

So, playing (A, a) in first period cannot be sustained in SPNE. (Note that even at $\delta = 1$)

c)(i) Both players are symmetric in payoffs/actions. We describe a strategy of Player 1. (which would describe a similar strategy of Player 2).

Consider 2 states: 1) Normal

2) Punishment.

Initial state is normal.
At any period, if the previous period is normal and (A,a) was played, then the state remains normal.

Else the state becomes punishment.

<u>strategy</u>
If state is normal play A (a for Player 2)

If state is punishment play C (c for Player 2).

So 2 types of subgames, (i) root is punishment.
(ii) root is normal.

If root is punishment prescribed strategy is Nash in every period, which is a NE of the subgame.

If root is normal. playing A gives Player 1 a payoff 4.
Using <u>one-shot deviation</u>, we check for deviation this period. If he deviates this period, he gets a payoff (max payoff) of 5.
But state shifts to punishment once he deviates giving him a payoff of 3.

So, total payoff from deviation

$$(1-\delta)\left[5 + \frac{3\delta}{1-\delta}\right] = 5(1-\delta) + 3\delta = 5-2\delta$$

For SPNE, we need to ensure

$$4 \geq 5-2\delta \iff \delta \geq 1/2$$

c)(ii) Here, the strategy uses the same states but uses different actions for punishment state.

The action is the minmax action.

In this case, the minmax payoff for both the agents is 2.

It is achieved by playing B/b.

So, the strategy for Player 1 (Player 2):

If state is normal play A. (a)

If state is punishment play B. (b)

By playing (A,a) gives Player 1 payoff 4. If it deviates in some period, the max payoff he can get is 5 in that period and 2 from then onwards.

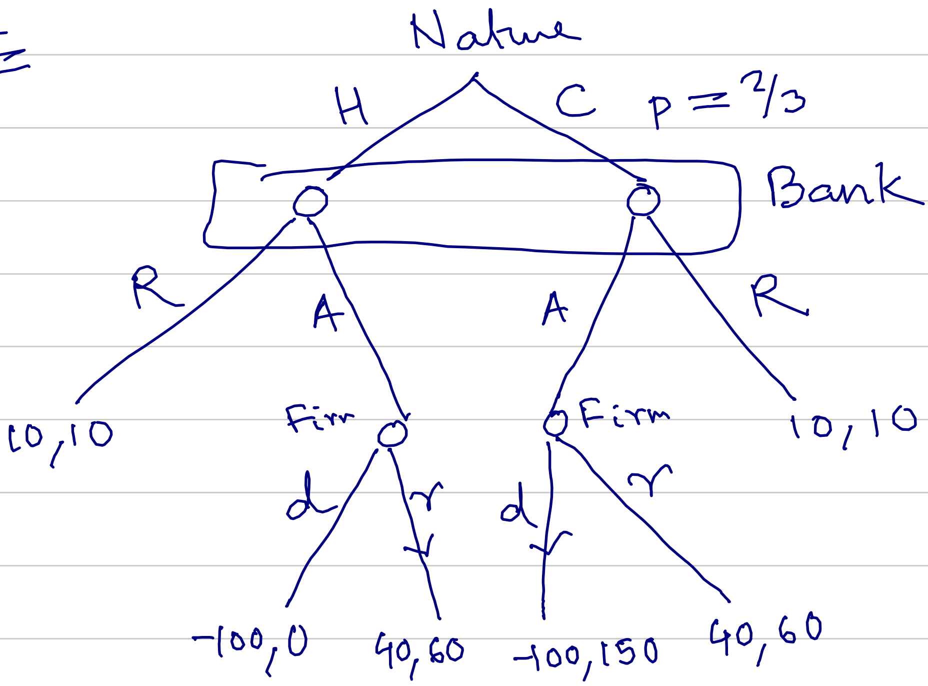
So, max. possible payoff from deviation

$$\left[5 + \frac{2\delta}{1-\delta}\right](1-\delta) = 5(1-\delta)+2\delta = 5-3\delta$$

For NE, we need to ensure that

$$4 \geq 5-3\delta \iff \delta \geq 1/3$$

Q2



Bank: A $\longrightarrow 40(1-p) + (-100)p = 40-140p < 10$ for $p = 2/3$

R $\longrightarrow 10$

Hence Bank Rejects in PBE.

Unique PBE (Left node 1/3, Right node 2/3; Bank: R, Firm: H type r, C type d).

This is also sequential eqm since all information sets are reached with +ve probability.

Q3.

$$N \supseteq S \supseteq Q$$
$$N \supseteq B \supseteq Q$$