Exercise Session 7
Consensus (part II)

Problem 1

Give the four properties of consensus. Give four executions, each of which violates exactly one of the consensus properties.

Problem 2

Algorithm 1 implements a consensus protocol using a perfect failure detector and best effort broadcast (beb). Assume you have to change this Algorithm 1 in order to obtain a **uniform consensus** protocol. Explain these changes and rewrite the algorithm accordingly.

Algorithm 1 Consensus Using a Perfect Failure Detector and Beb

Upon event $< Init >$ **do**

1: $suspected = \emptyset$
2: $round = 1$
3: $currentProposal = nil$
4: $broadcast = false$
5: $delivered[] = false$

Upon event $< Crash, p_i >$ **do**

1: $suspected = suspected \cup \{p_i\}$

Upon event $< Propose, v >$ **do**

1: **if** $currentProposal == nil$ **then**
2: $\quad currentProposal = v$
3: **end if**

Upon event $< bebDeliver, p_{round}, value >$ **do**

1: $currentProposal = value$
2: $delivered[round] = true$

Upon event $delivered[round] == true$ **or** $p_{round} \in suspected$ **do**

1: $round = round + 1$

Upon event $p_{round} == self$ **and** $broadcast == false$ **and** $currentProposal \neq nil$

1: **trigger** $< Decide, currentProposal >$
2: **trigger** $< bebBroadcast, currentProposal >$
3: $broadcast = true$