Solution Sketch for PS6

1. **Solution**

(a) MR,MR,MB,MB

(b) Everyone will guess the urn contains a majority of the color that they observed.

(c) MR,MR,MR,MR. Note: P4 only knows P2 and P3 both guessed MR, so it is necessarily true that they know player 3's guess is uninformative. Indeed from P4's perspective, P1-P3 may have observed the following balls (each with prob. 1/3): (B,R,R), (R,R,B), (R,R,R), which means the conditional probability should be
$(P[MB|BRRB] + P[MB|RRBB] + P[MB|RRRB])/3 = (1/2 + 1/2 + 1/5)/3 = 2/5 < 1/2$

2. **Solution**

(a) $b/(a+b) < p \leq 1$

(b) Player 2 will always guess Urn A regardless

(c) Player 3 will guess Urn A since $P(UrnA|BRB) = 9/17 > P(UrnB|BRB) = 8/17$

(d) Player 3 will guess Urn B since $P(UrnA|BRB) = 3/7 < P(UrnB|BRB) = 4/7$

(e) $q \geq b/(a+b)$

3. **Solution**

(a) $4 \times 4 = 16$

(b) $A = \{(1,1),(1,2),(2,1),(2,2),(2,3),(3,2),(3,3),(3,4),(4,3),(4,4)\}$
$B = \{(1,1),(1,2),(1,3),(1,4),(3,1),(3,2),(3,3),(3,4)\}$
$A \cap B = \{(1,1),(1,2),(3,2),(3,3),(3,4)\}$.

(c) $P(A) = 5/8$, $P(B) = 1/2$, $P(A \cap B) = 5/16$, $P(A|B) = 5/8$, $P(B|A) = 1/2$.