

Figure 1: Q01:  $L_1 = (a+b)^*a$

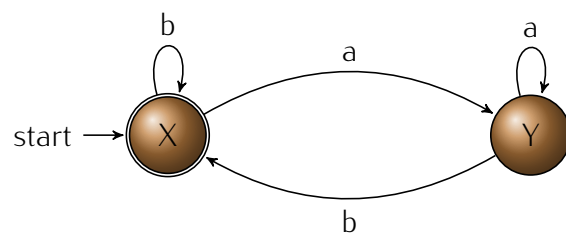


Figure 2: Q01:  $L_2 = b(a+b)^*$

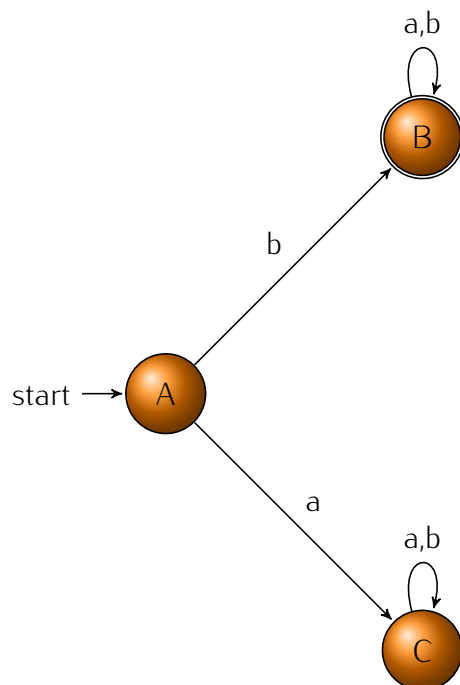


Figure 3: Q01:  $L_1 \cap L_2$

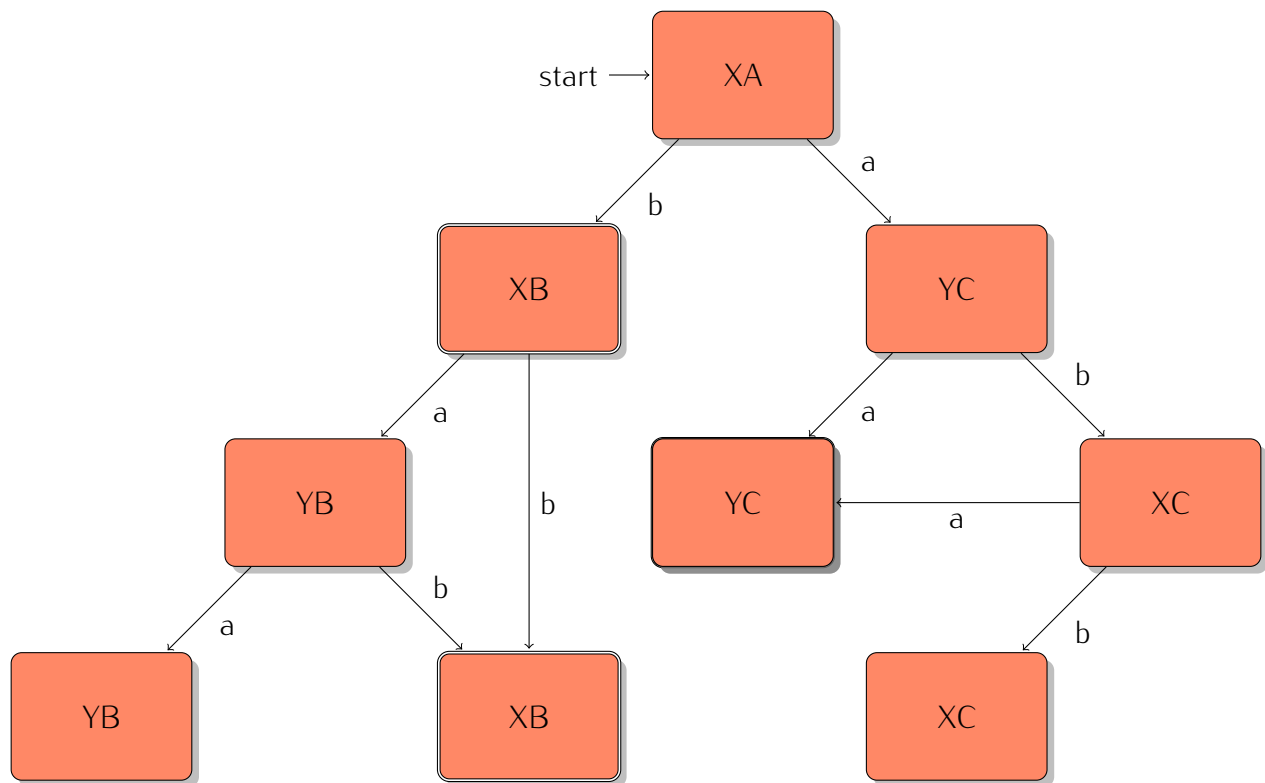


Figure 4: Q01:  $L_3 = b(b+aa^*b)^*$

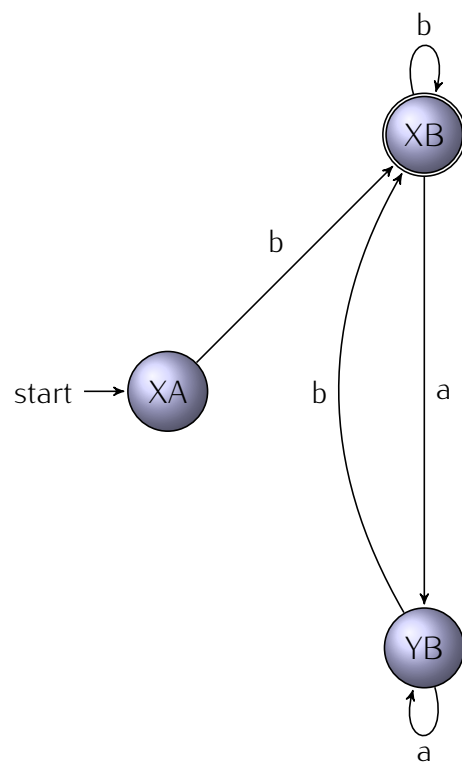


Figure 5: Q02:  $L_1 = (a+b)b(a+b)^*$

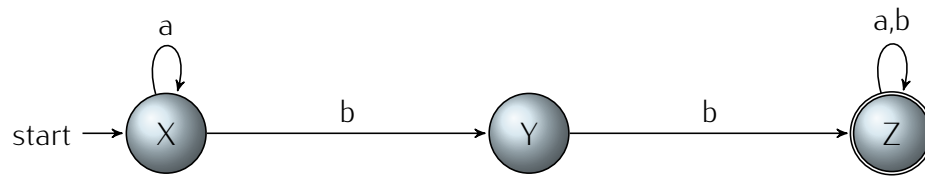


Figure 6: Q02:  $L_2 = b(a+b)^*$

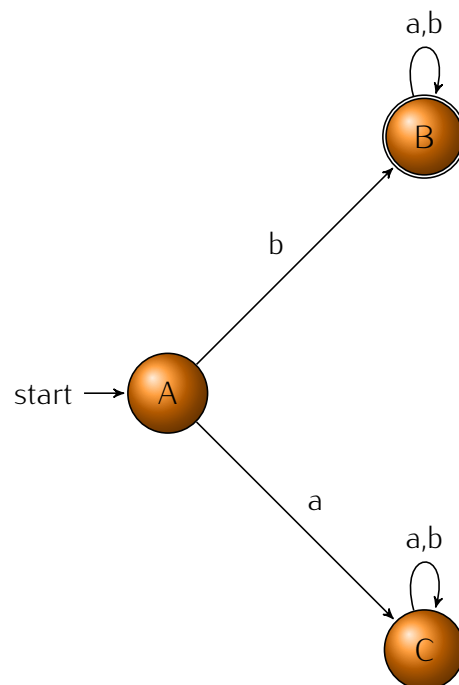


Figure 7: Q02:  $L_1 \cap L_2$

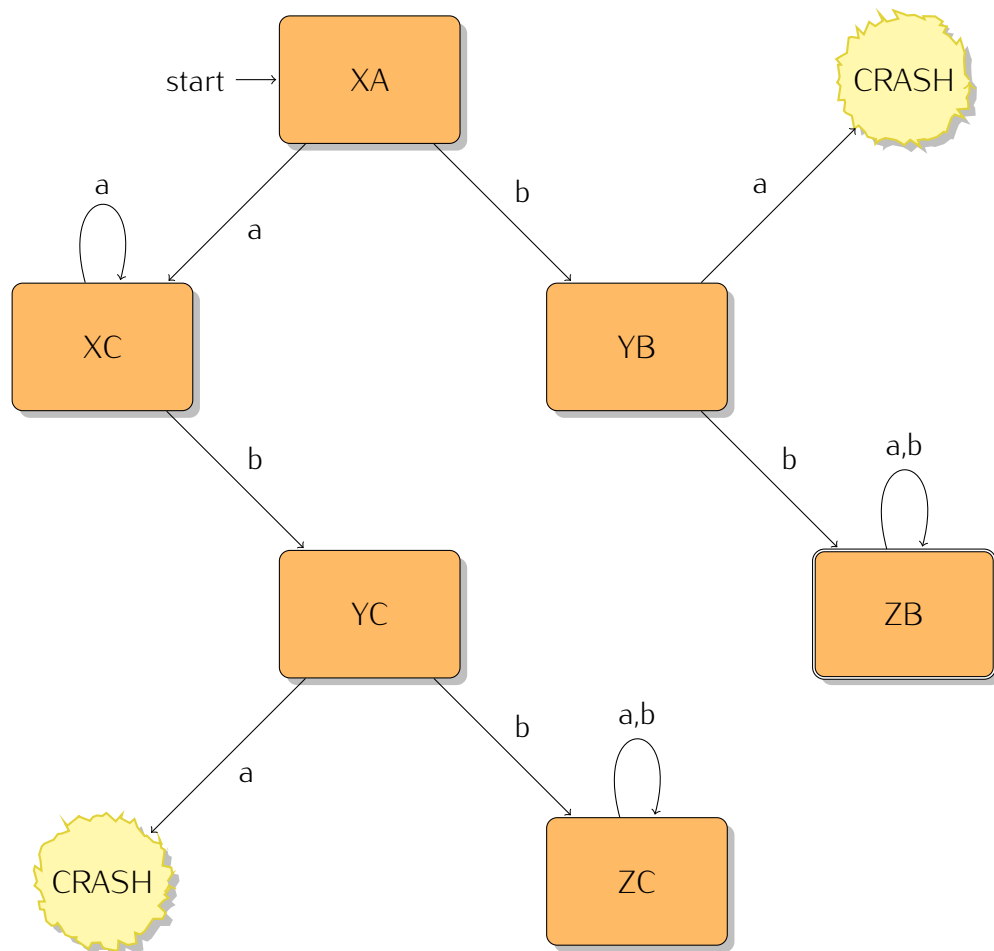


Figure 8: Q02:  $L_3 = ab(a+b)^*$

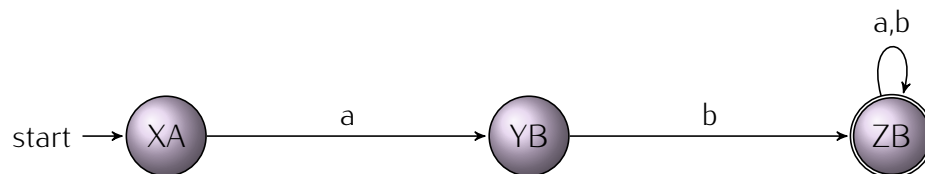


Figure 9: Q03:  $L_1 = (b+ab)^*(a+\Lambda)$

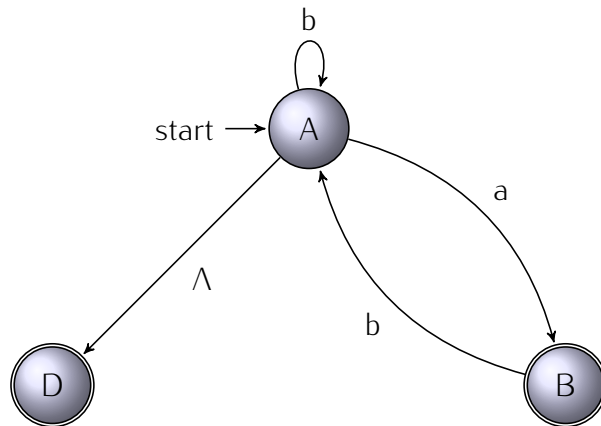


Figure 10: Q03:  $L_2 = (a+b)^*aa(a+b)^*$

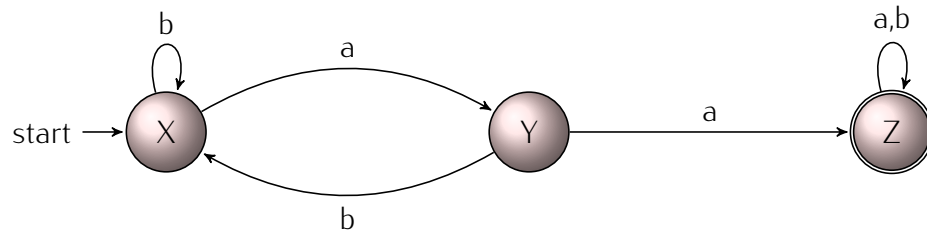


Figure 11: Q02:  $L_1 \cap L_2$

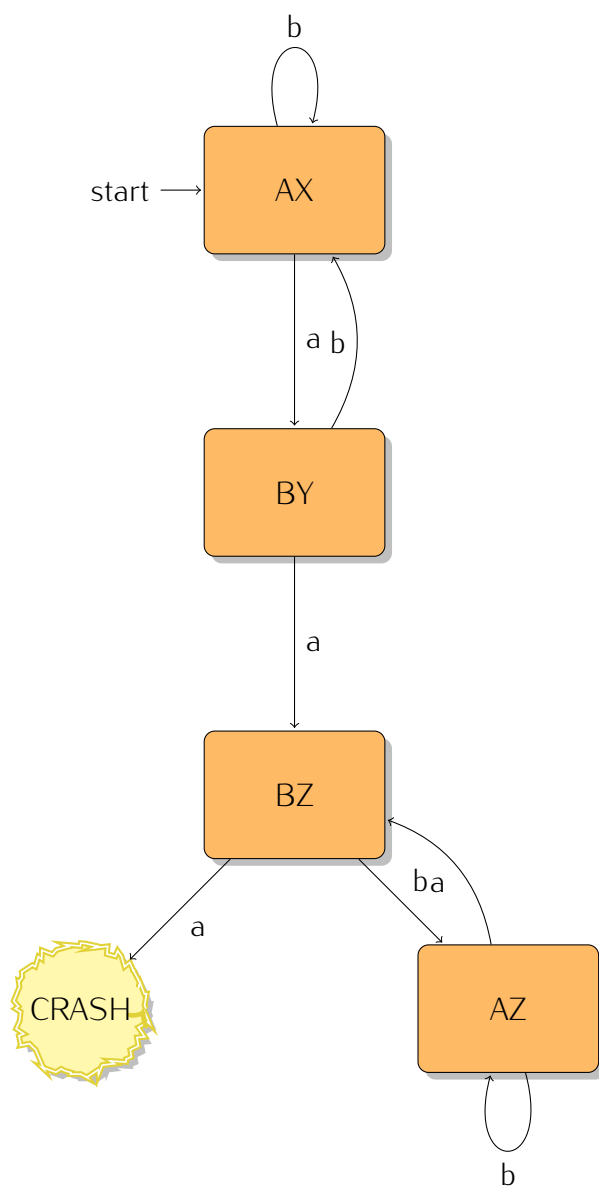


Figure 12: Q03:  $L_3 = (b+ab)^*aa(bb^*a)^*$

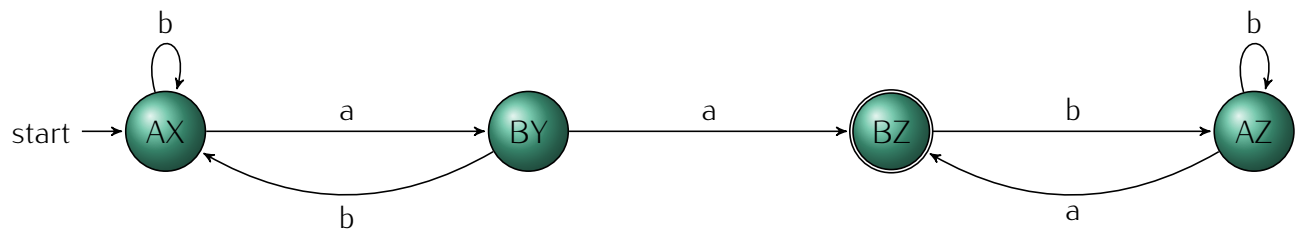




Figure 13: Q04:  $L_1 = (aa+ab+ba+bb)^*$

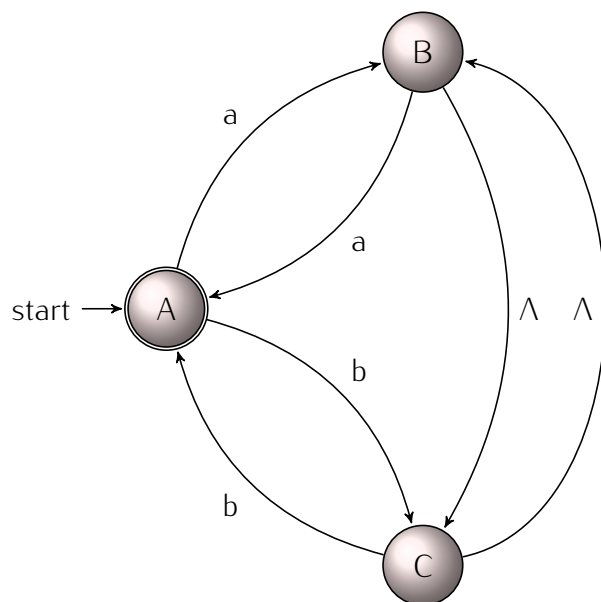


Figure 14: Q04:  $L_2 = b(a+b)^*$

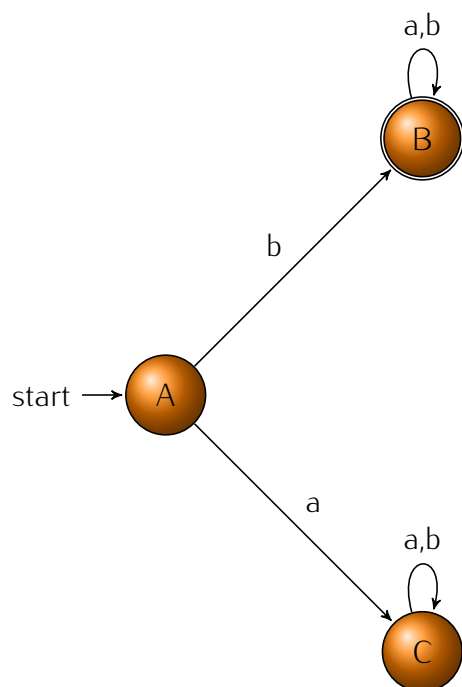


Figure 15: Q04:  $L_1 \cap L_2$

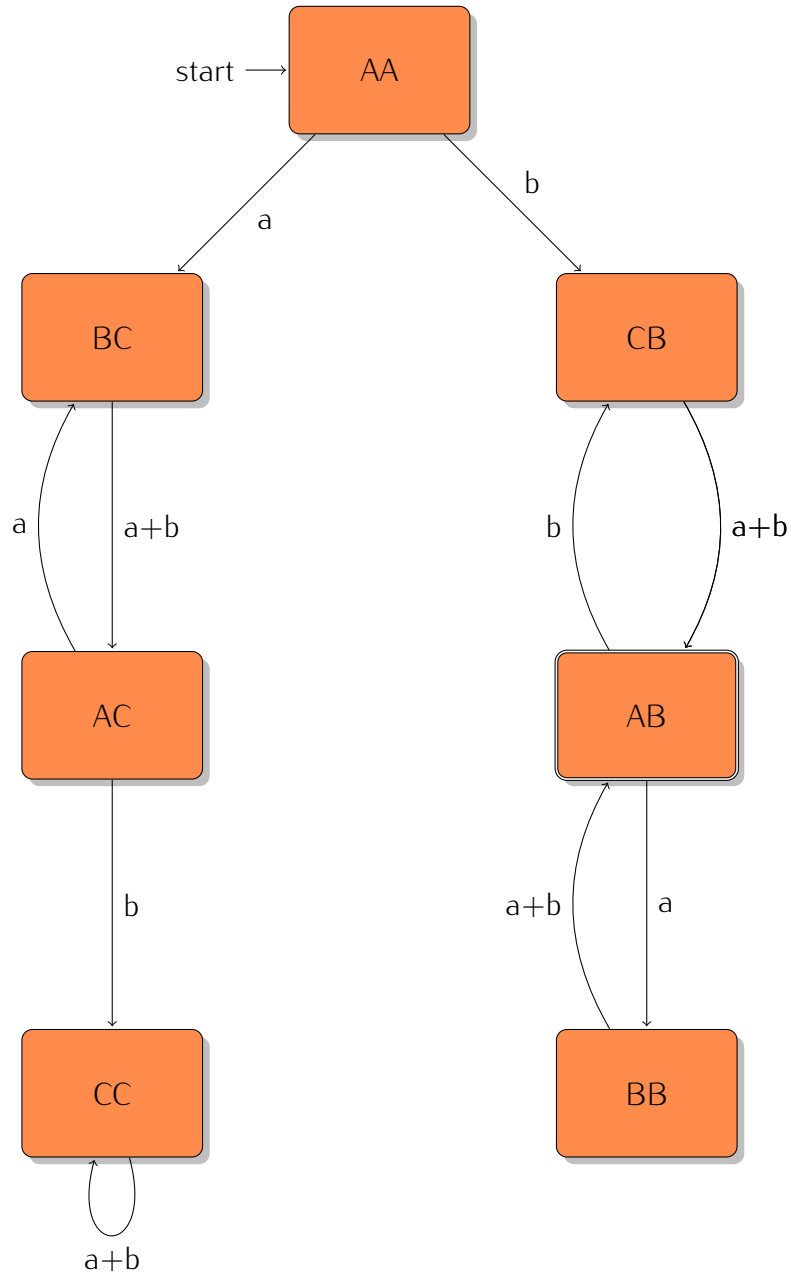


Figure 16: Q04:  $L_3 = b(a+b)(b(a+b)+a(a+b))$

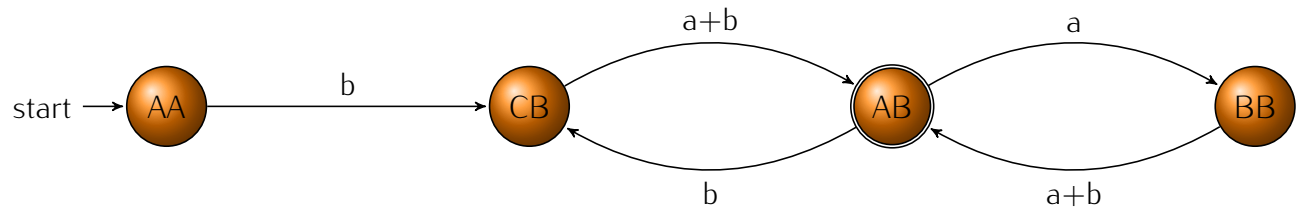


Figure 17: Q05:  $L_1 = (aaa+bbb)^*$

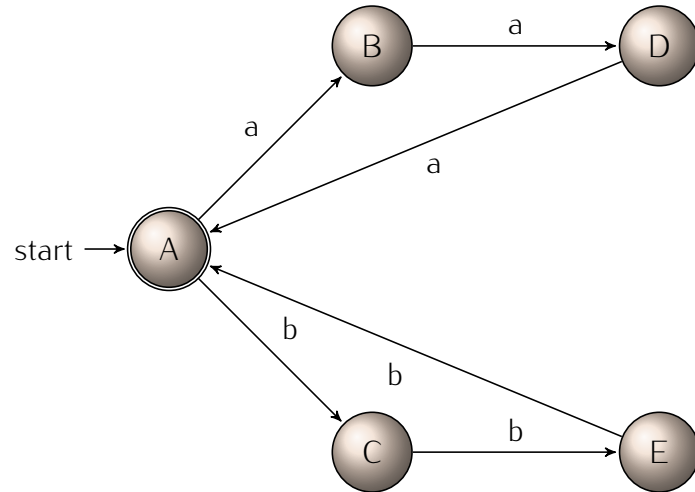


Figure 18: Q05:  $L_2 = a(a+b)^*$

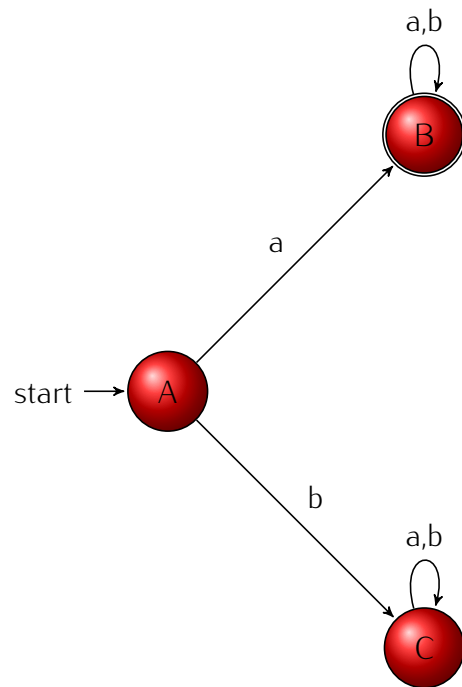


Figure 19: Q05:  $L_1 \cap L_2$

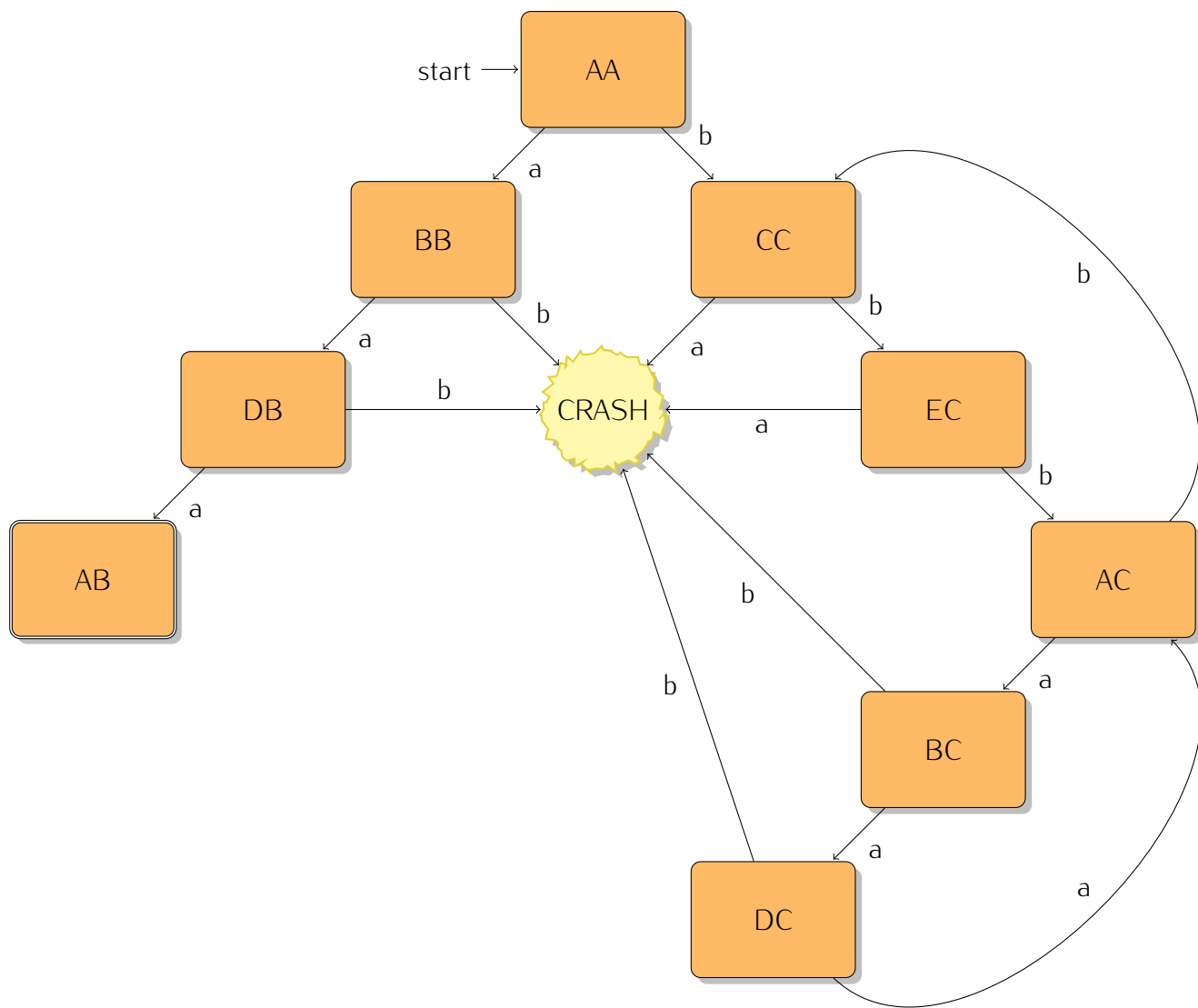


Figure 20: Q05:  $L_3 = aaa$

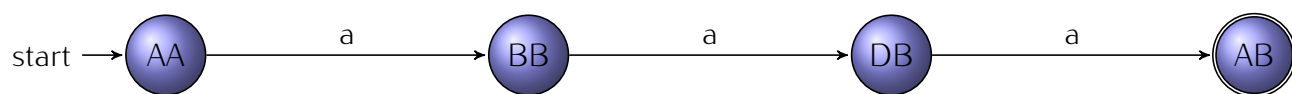


Figure 21: Q06:  $FA_1$

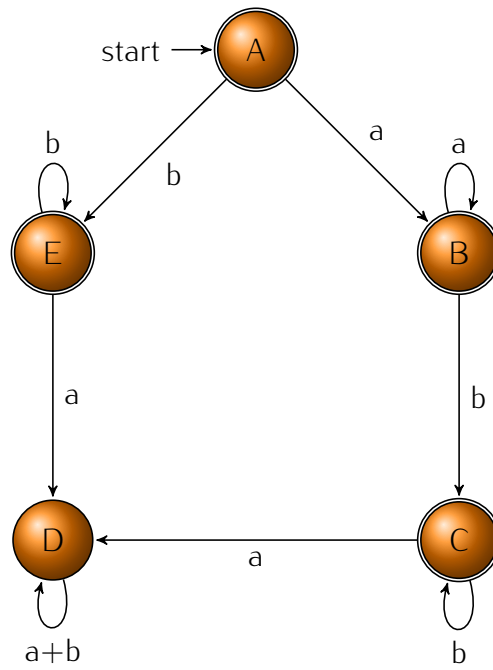


Figure 22: Q06:  $FA_2$

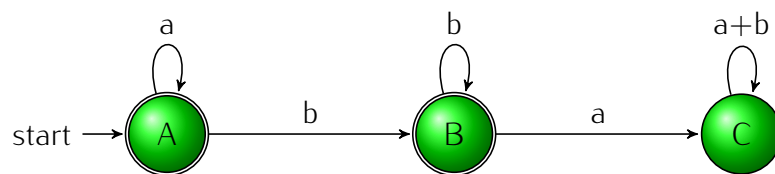
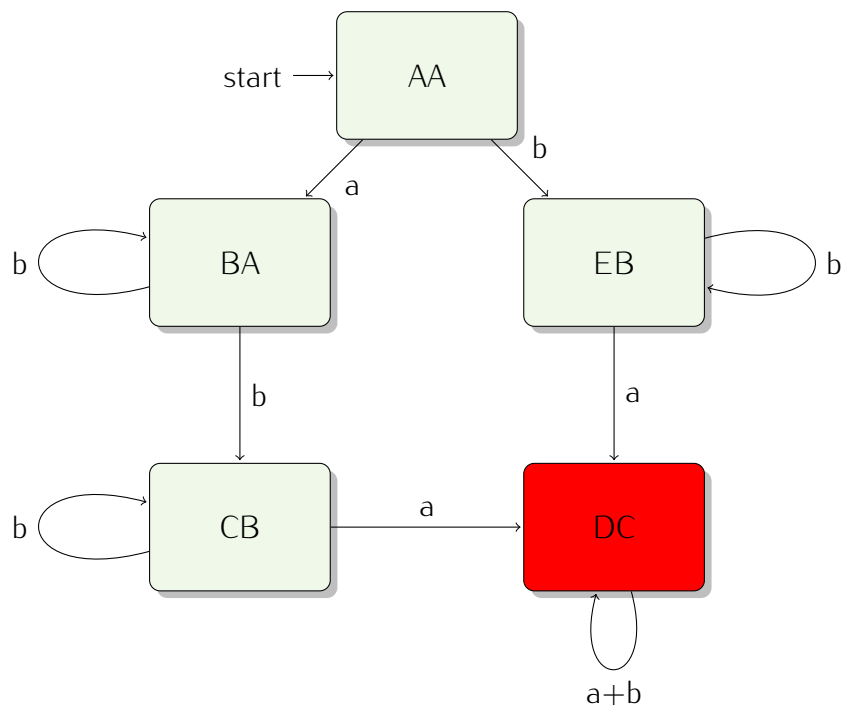


Figure 23: Q06:  $L_1 \cap L_2$



Not acceptable by  $L_1 \cap L_2$ : DC

Acceptable by  $L_1 \cap L_2$ : AA, BA, CB, EB

Figure 24: Q07:  $FA_1$

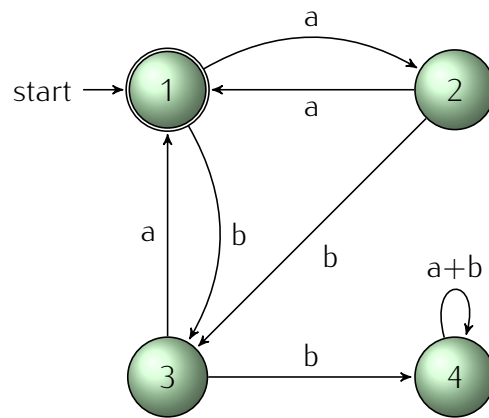
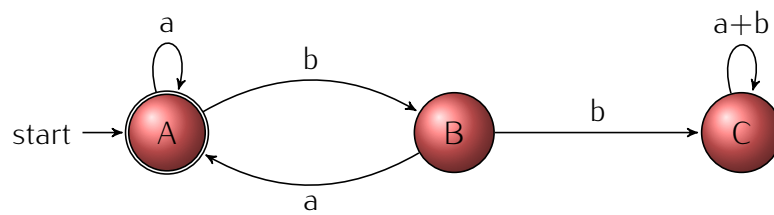


Figure 25: Q07:  $FA_2$



The following are equivalent due to the below proofs in Figures 26-31:



Figure 26: Q07:  $FA'_1$

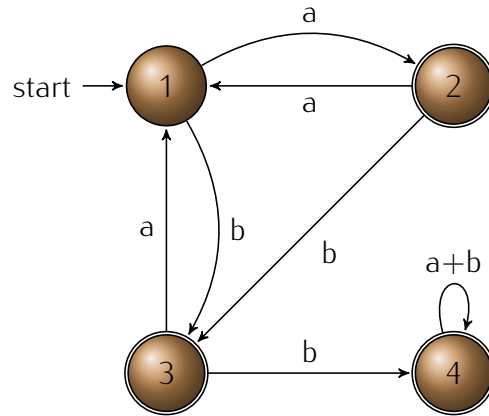


Figure 27: Q07:  $FA_2$

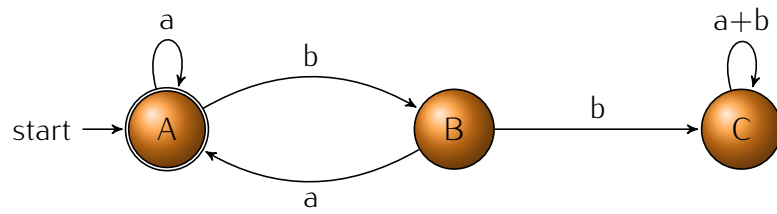


Figure 28: Q07:  $(FA'_1 + FA_2)'$  No final states

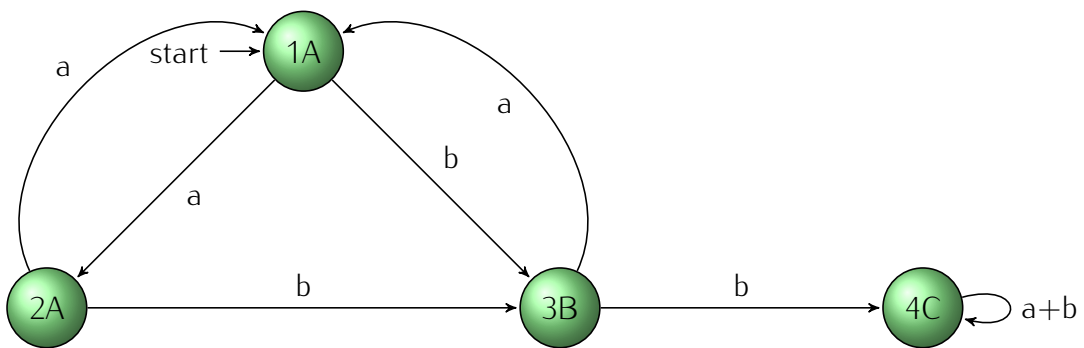


Figure 29: Q07:  $FA_1$

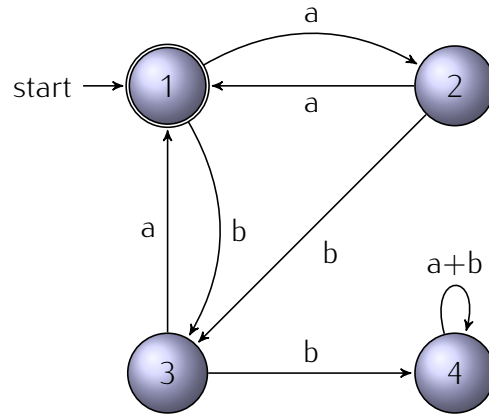


Figure 30: Q07:  $FA'_2$

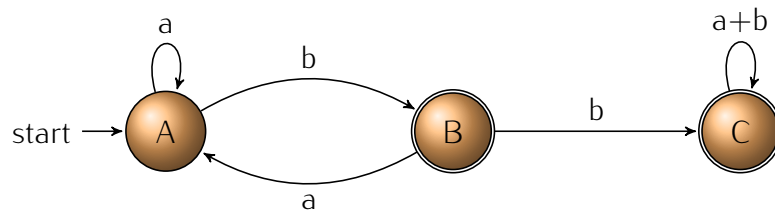


Figure 31: Q07:  $(FA_1 + FA'_2)'$  No final states

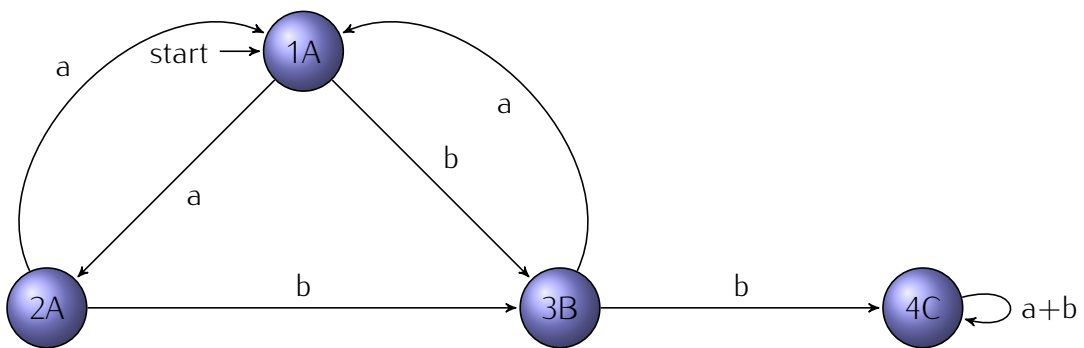


Figure 32: Q08:  $FA_1$

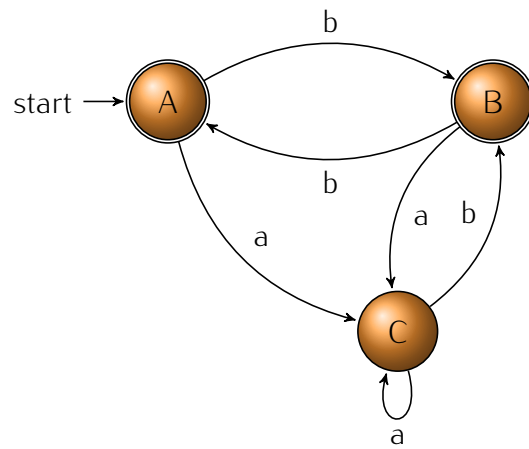


Figure 33: Q08:  $FA_2$

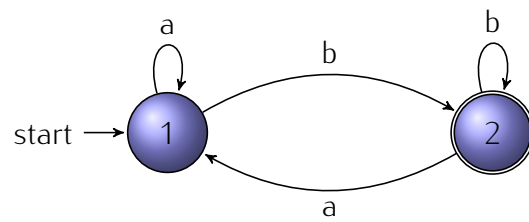
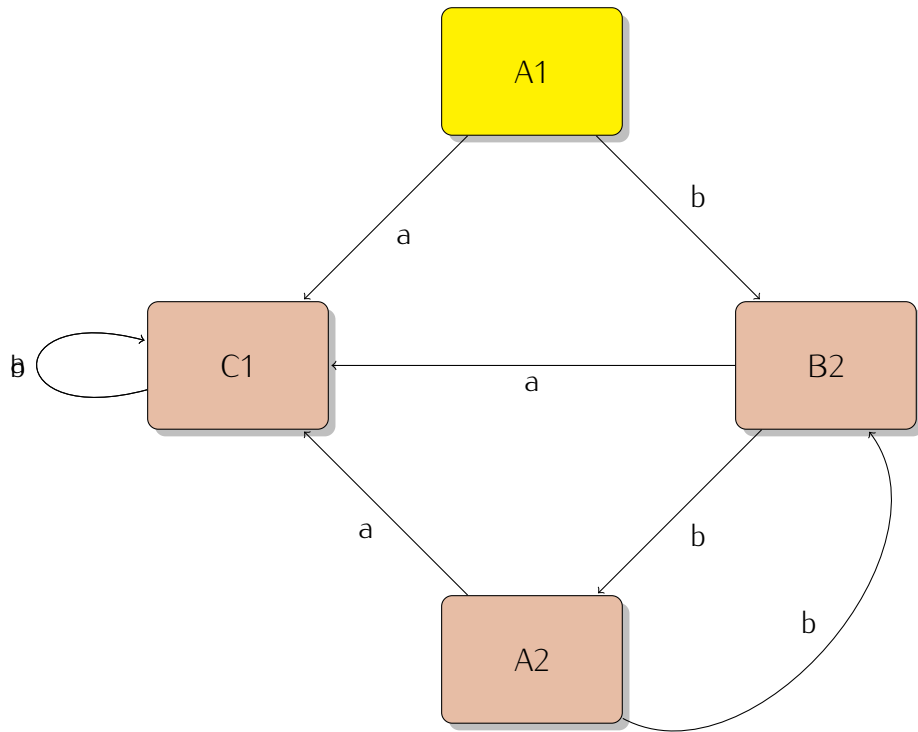


Figure 34: Q08:  $L_1 \neq L_2$



Not acceptable by  $L_1 \cap L_2$ : C1  
 Acceptable by  $L_1 \cap L_2$ : A2, B2  
 Acceptable by  $L_1$  only: A1, B1  
 Acceptable by  $L_2$  only: C2  
 Due to A1:  $L_1 \neq L_2$

Figure 35: Q09:  $FA_1$

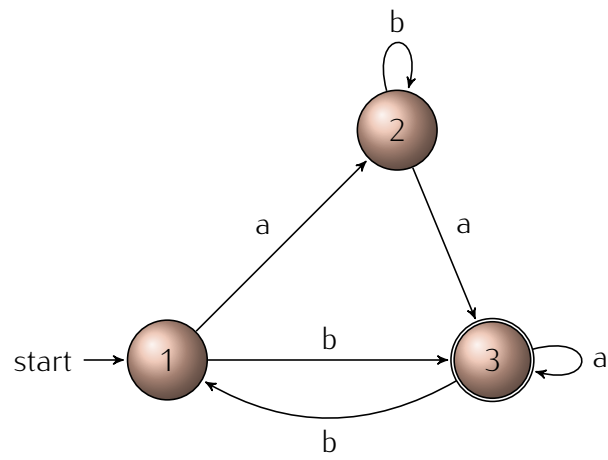


Figure 36: Q09:  $FA_2$

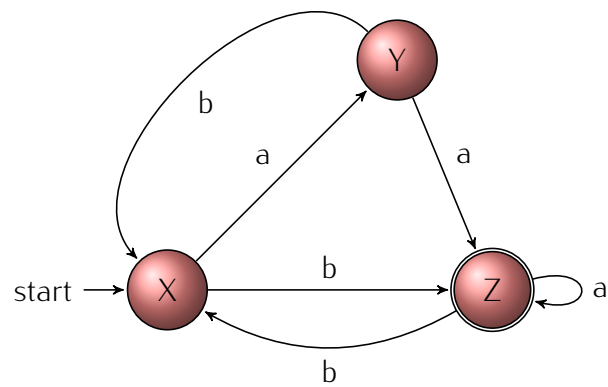
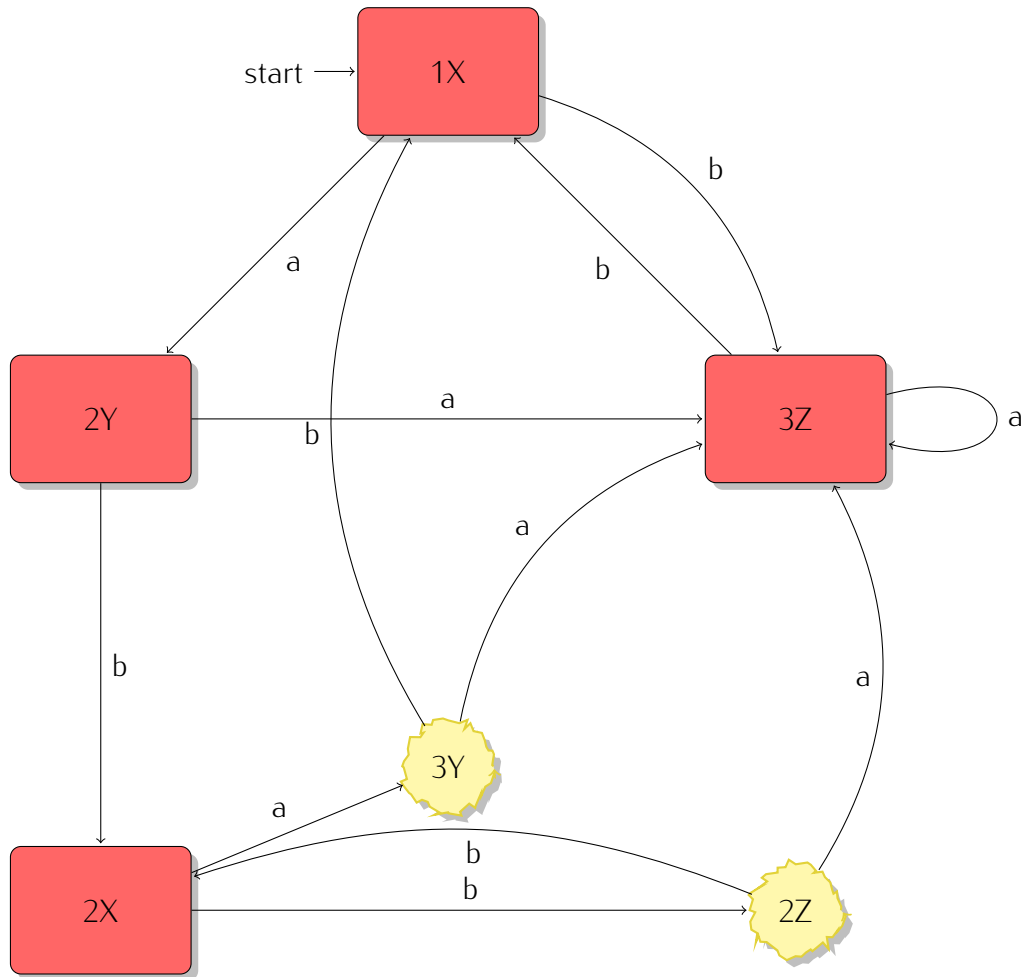


Figure 37: Q09:  $L_1 \neq L_2$



Not acceptable by  $L_1 \cap L_2$ : 1X, 1Y, 2X, 2Y

Acceptable by  $L_1 \cap L_2$ : 3Z

Acceptable by  $L_1$  only: 3X, 3Y

Acceptable by  $L_2$  only: 1Z, 2Z

Due to 3Y and 2Z:  $L_1 \neq L_2$

Figure 38: Q10: Blue Paint

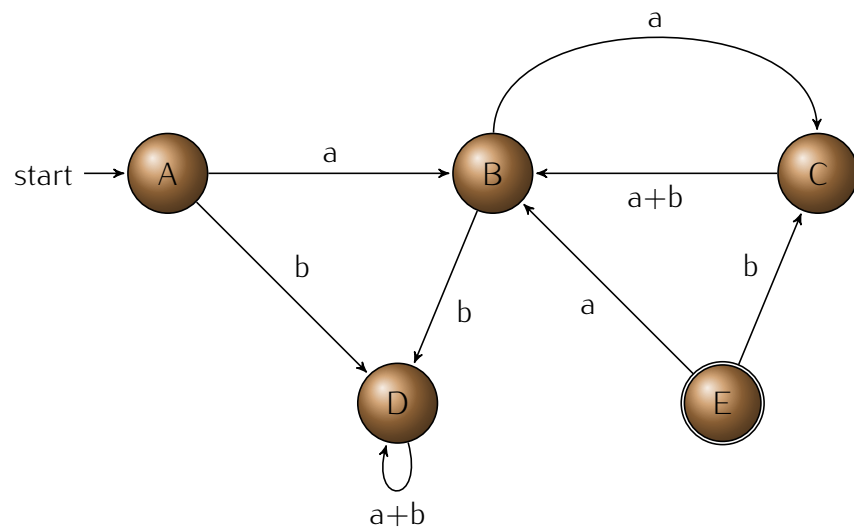


Figure 39: Q10: Step 1

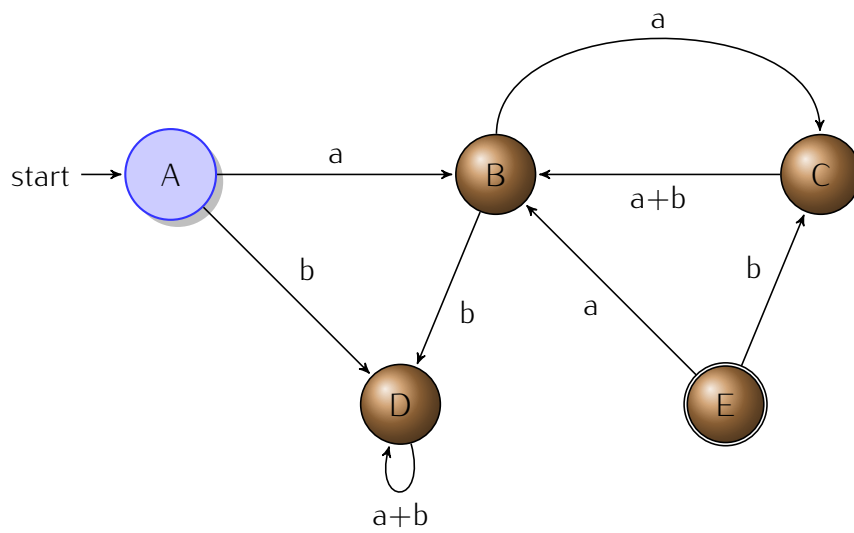


Figure 40: Q10: Step 2

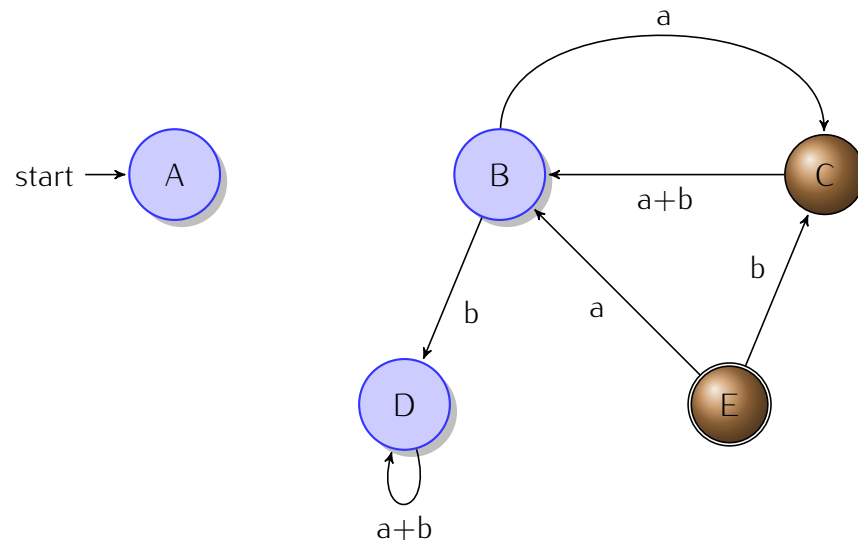


Figure 41: Q10: Step 3

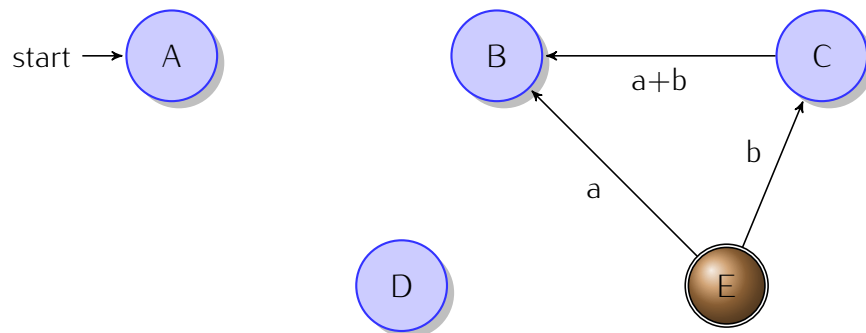
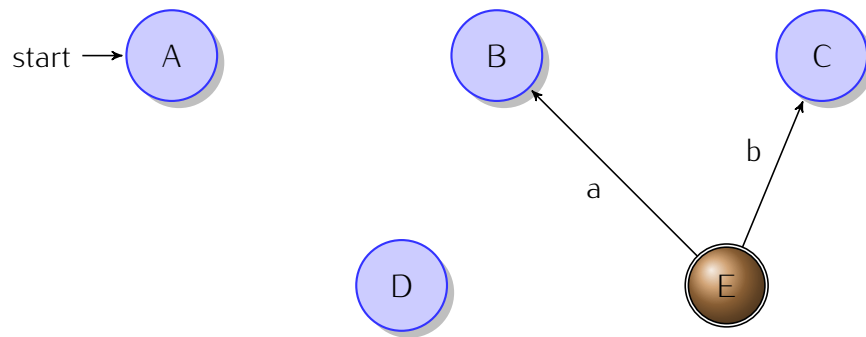




Figure 42: Q10: Step 4



This machine accepts no words due to the fact that node E remains unpainted and is the only final state.

Figure 43: Q11: Blue Paint

