

# Homework 7

1.  $C_9 = XXq_3 \# X \mid$
- $C_{10} = XX \# q_5 X \mid$
- $C_{11} = XX \# Xq_5 \mid$
- $C_{12} = XX \# q_6 XX$
- $C_{13} = XXq_6 \# XX$
- $C_{14} = Xq_7 X \# XX$
- $C_{15} = XXq_1 \# XX$

2a. Input:  $0^{(2^3)} = 00000000$

- |                               |                          |                          |
|-------------------------------|--------------------------|--------------------------|
| 1: $\sqcup q_2 0000000$       | 8: $\sqcup X0X0X0Xq_3$   | 15: $\sqcup q_5 X0X0X0X$ |
| 2: $\sqcup Xq_3 0000000$      | 9: $\sqcup X0X0X0q_5 X$  | 16: $q_5 \sqcup X0X0X0X$ |
| 3: $\sqcup X0q_4 0000000$     | 10: $\sqcup X0X0Xq_5 0X$ | 17: $\sqcup q_2 X0X0X0X$ |
| 4: $\sqcup X0Xq_3 0000000$    | 11: $\sqcup X0X0q_5 X0X$ | 18: $\sqcup Xq_2 0X0X0X$ |
| 5: $\sqcup X0X0q_4 0000000$   | 12: $\sqcup X0Xq_5 0X0X$ | 19: $\sqcup XXq_3 X0X0X$ |
| 6: $\sqcup X0X0Xq_3 0000000$  | 13: $\sqcup X0q_5 X0X0X$ |                          |
| 7: $\sqcup X0X0X0q_4 0000000$ | 14: $\sqcup Xq_5 0X0X0X$ |                          |
- 2nd  $q_2$  to  $q_3$  transition

b. Input: 0000000

1.  $\sqcup q_2 0000000$
2.  $\sqcup Xq_3 0000000$
3.  $\sqcup X0q_4 0000000$
4.  $\sqcup X0Xq_3 0000000$
5.  $\sqcup X0X0q_4 0000000$
6.  $\sqcup X0X0Xq_3 0000000$

7.  $\sqcup X0X0X0q_4$

reject configuration:

$\sqcup X0X0X0 \sqcup q_{\text{reject}}$

c. Input: 000000

- |                             |                               |                               |
|-----------------------------|-------------------------------|-------------------------------|
| 1. $\sqcup q_2 000000$      | 7. $\sqcup X0X0q_5 X \sqcup$  | 13. $\sqcup q_2 X0X0X \sqcup$ |
| 2. $\sqcup Xq_3 000000$     | 8. $\sqcup X0Xq_5 0X \sqcup$  | 14. $\sqcup Xq_2 0X0X \sqcup$ |
| 3. $\sqcup X0q_4 000000$    | 9. $\sqcup X0q_5 X0X \sqcup$  | 15. $\sqcup XXq_3 X0X \sqcup$ |
| 4. $\sqcup X0Xq_3 000000$   | 10. $\sqcup Xq_5 0X0X \sqcup$ | 16. $\sqcup XXq_3 0X \sqcup$  |
| 5. $\sqcup X0X0q_4 000000$  | 11. $\sqcup q_5 X0X0X \sqcup$ | 17. $\sqcup XXX0q_4 X \sqcup$ |
| 6. $\sqcup X0X0Xq_3 000000$ | 12. $q_5 \sqcup X0X0X \sqcup$ | 18. $\sqcup XX X0Xq_4 \sqcup$ |

19.  $\sqcup XXX0X \sqcup q_{\text{reject}}$

3 while unmarked a's exist

mark an a, scan right past 1st #

mark a b, scan right past 2nd #

mark a c

scan left until you pass a marked a

Scan right past all marked, if there is unmarked, then reject

4a. T

b. F

c. T

d. F

e. F

f. T

g. T

h. T

Citations: Textbook and Notes