Quantitative Verification Session 2 – Solutions

November 2, 2017

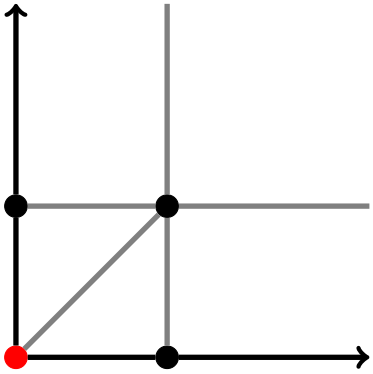

Figure 1: $x = y = 0$

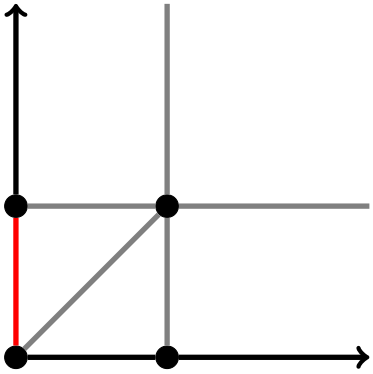

Figure 4: $x = 0, y \in (0, 1)$

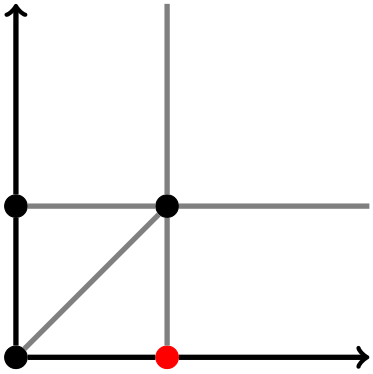

Figure 7: $x = 1, y = 0$

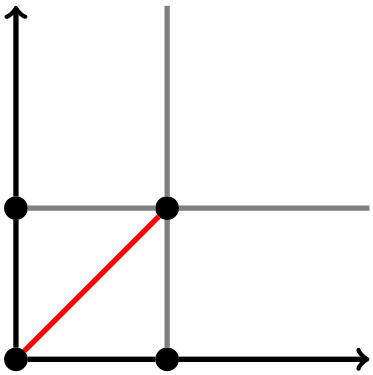

Figure 2: $x = y \in (0, 1)$

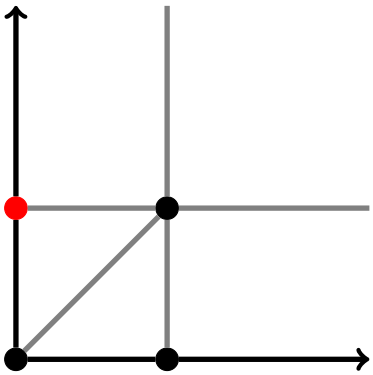

Figure 5: $x = 0, y = 1$

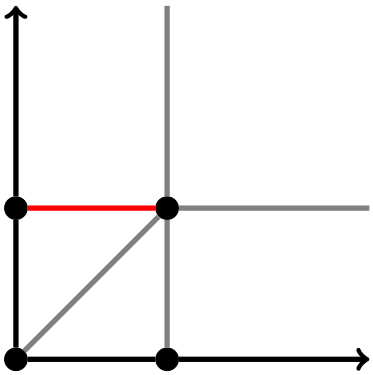

Figure 8: $x \in (0, 1), y = 1$

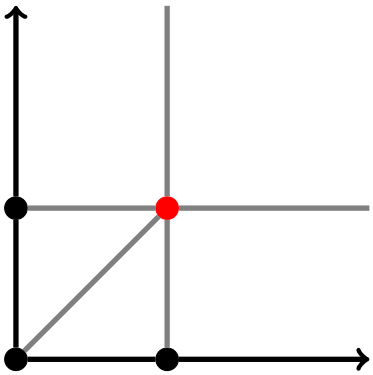

Figure 3: $x = y = 1$

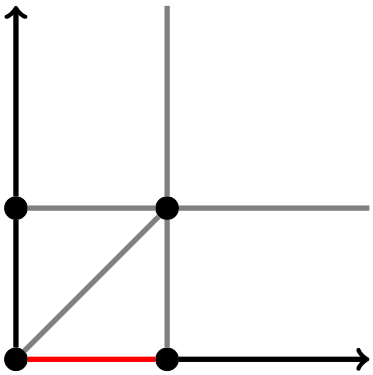

Figure 6: $x \in (0, 1), y = 0$

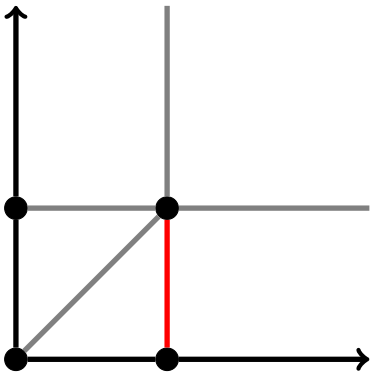

Figure 9: $x = 1, y \in (0, 1)$

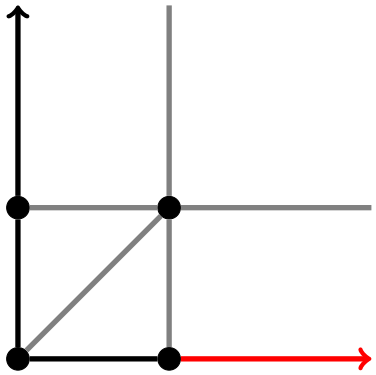

Figure 10: $x > 1, y = 0$

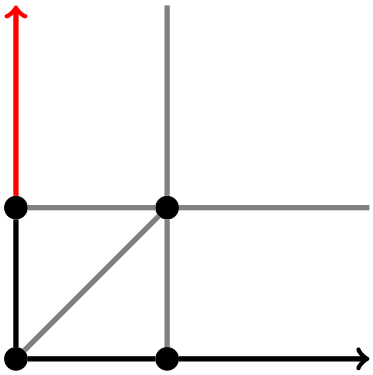

Figure 13: $x = 0, y > 1$

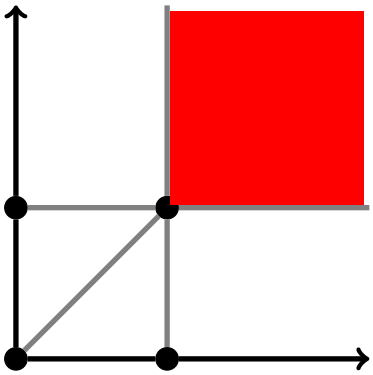

Figure 16: $x > 1, y > 1$

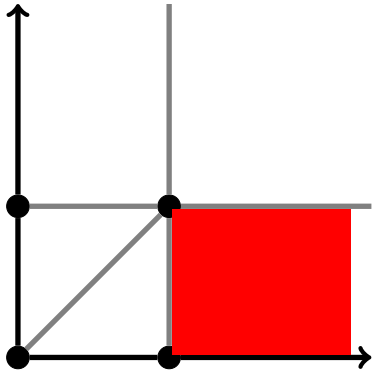

Figure 11: $x > 1, y \in (0, 1)$

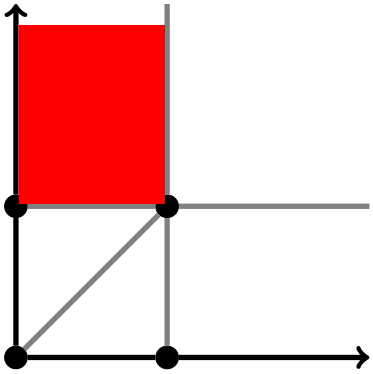

Figure 14: $x \in (0, 1), y > 1$

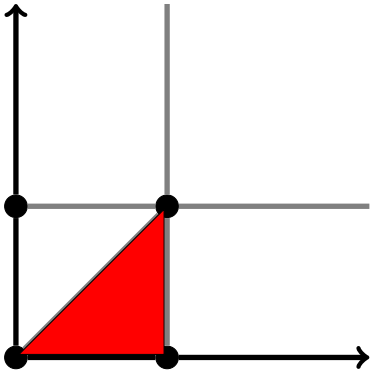

Figure 17: $x > y,\ x, y \in (0, 1)$

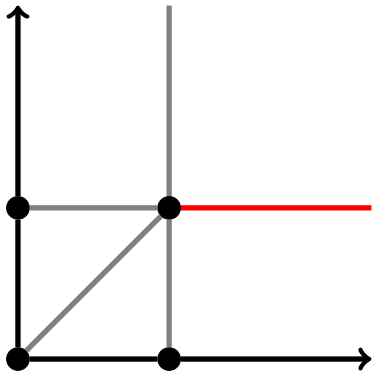

Figure 12: $x > 1, y = 1$

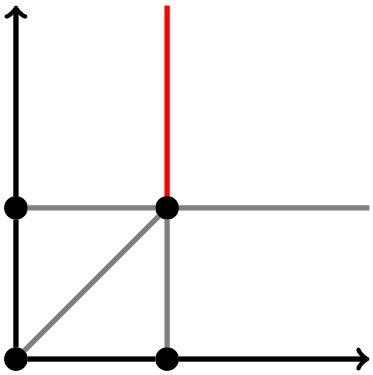

Figure 15: $x = 1, y > 1$

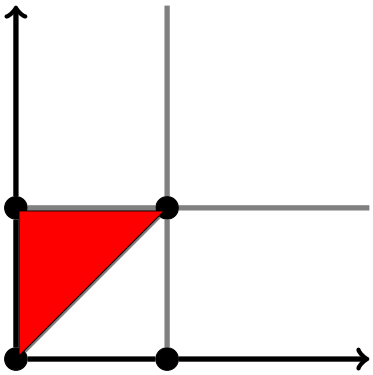

Figure 18: $x < y,\ x, y \in (0, 1)$

Summary

1. $x = y = 0$
2. $x = y \in (0, 1)$
3. $x = y = 1$
4. $x = 0, y \in (0, 1)$
5. $x = 0, y = 1$
6. $x \in (0, 1), y = 0$
7. $x = 1, y = 0$
8. $x \in (0, 1), y = 1$
9. $x = 1, y \in (0, 1)$
10. $x > 1, y = 0$
11. $x > 1, y \in (0, 1)$
12. $x > 1, y = 1$
13. $x = 0, y > 1$
14. $x \in (0, 1), y > 1$
15. $x = 1, y > 1$
16. $x > 1, y > 1$
17. $x > y,\ x, y \in (0, 1)$
18. $x < y,\ x, y \in (0, 1)$

Exercise 1. Refer to the photograph below of the region automaton we drew in class. As a shorthand for writing (s, R) where s is a state and R is a region, we write $s_{index(R)}$, where $index(R)$ is obtained from the "summary" section on the previous page. Also note that we have updated the original exercise sheet to make the maximum constant of clock x to be 1.