Quiz 1 Review Questions

1. When is a city function smart?
2. What is the difference between control and optimization?
3. How to write the four-stage formulation of a decision-making problem?
4. What is the difference between centralized and decentralized decision-making?
5. What is the difference between open-loop and closed-loop decision-making?
6. What are the actions involved in driving?
7. What information needs to be observed to enable autonomous driving?
8. What are some maneuvers that a computer driver can do but a human driver cannot?
9. What do longitudinal and lateral controls do?
10. How to formulate the longitudinal control problem?
11. What are reference and actual speeds?
12. What is asymptotic stability?
13. How to do speed tracking, position tracking, and vehicle following?
14. Why do we sometimes want to linearize a model?
15. What is control saturation?
16. How to incorporate noise in system dynamics?
17. What is model identification?
18. How to formulate the trajectory planning problem?
19. What is a linear programming, and what is a quadratic programming?
20. What is a convex optimization problem?
21. What is a feasible solution, and what is an optimal solution?
22. When does the trajectory planning have no feasible solutions?
23. What is a control policy or a control law?
24. What is vehicle platooning?
25. What is the motivation for platooning?
26. What is the technological basis for platooning?
27. What is a neural network?
28. How do we use a neural network to approximate a function?
29. Why neural networks was not popular until recently?
30. What is a signal-free intersection?
31. What is the difference between a conventional and a high-speed signal-free intersection?
32. Why latency can lead to efficiency loss at a high-speed signal-free intersection?
33. What are some system-level decisions involved by vehicle platooning?
34. What are some pros and cons of a long vehicle platoon?
35. When do we say the traffic queue at an intersection to be stable?
36. How to write the transition probabilities for the traffic queues at an intersection?
37. What is the relation between traffic flow, traffic density, and traffic speed?
38. How to evaluate the efficiency of a highway?
39. How does the environment affect the flow-density relation?
40. Does a linear min-cost flow problem capture congestion effect on links?
41. How to construct an optimal solution to an uncapacitated min-cost flow problem?