0.5/5

Exercise 9.1

0.5/1

Exercise 9.2

(a) No, the statement is not correct. A language can be in both P and NP because P represents problems solvable in polynomial time, while NP represents problems verifiable in polynomial time. Being verifiable in polynomial time does not preclude a problem from also being solvable in polynomial time, thus allowing a language to belong to both classes. ✓ P subset NP

(b) The statement is not necessarily true. If X is an NP-complete problem and Y is a problem with $X \leq Y$ (meaning Y is polynomial-time reducible to X), it does not automatically imply that Y is NP-complete. The NP-completeness of a problem is not preserved under polynomial-time reductions in the general case. X is reduced to Y, as X is NP-hard, Y is NP-hard but not NP complete

0/2

Exercise 9.3

I cannot prove that all languages in NP are decidable because it is not true. In fact, the question of whether P (class of problems decidable in polynomial time) is equal to NP is an open problem in computer science. If P = NP were proven, it would imply that all languages in NP are decidable. However, as of now, it remains an unsolved question. ✗