A. Perform the reduction from 3SAT to HAMPATH described in class (and in the proof of Theorem 7.46) on these examples:

$$\phi = (x \vee y \vee \bar{z}) \wedge (\bar{x} \vee \bar{y} \vee \bar{z}),$$

and

$$\phi = (x \vee y \vee y) \wedge (x \vee \bar{y} \vee \bar{y}) \wedge (\bar{x} \vee \bar{x} \vee \bar{x}).$$

Based on these examples, explain how if ϕ has a satisfying assignment then the resulting graph G has a Hamiltonian path from node s to node t. Then explain the converse.

B. Suppose that a language A is decidable in space $s(n)$ on a non-deterministic Turing machine. Estimate the time required to decide A on a deterministic Turing machine.

C. Is PSPACE closed under concatenation? (Problem 8.4 asks about other closure properties, but not this one.)

D. Let $A = \{\langle M \rangle : M \text{ is a TM with time complexity } \mathcal{O}(n^2)\}$. Show that A is not recognizable by reducing $\text{HALT}_{\text{TM}}^c$ to A.