Homework 5
Math 167 / CS 142: Complexity Theory

1. Problem 17.3.11 of the text.

   Suppose that the cities in a Euclidean instance of the TSP are the vertices of a convex polygon. Then not only is the optimum tour easy to find (it is the perimeter of the polygon); but the instance has the *master tour property*: There is a tour such that the optimum tour of any subset of cities is obtained by simply omitting from the master tour the cities not in the subset.

   Show that deciding whether a given instance of the TSP has the master tour property is in $\Sigma_2\mathbf{P}$.

2. Part (a) of Problem 9.5.4 of the text.

   Show that the special case of SAT in which each variable can only appear *twice* is in $\mathbf{P}$.

3. Problem 9.5.6 of the text.

   Show that the special case of SAT in which each clause is *either Horn or has two literals* is $\mathbf{NP}$-complete. (In other words, the polynomial special cases of SAT do not mix well.)