CSC 373 H1 | Quiz # 11 | 22 November 2012

*Aids Allowed*: **none** | *Worth*: 1.5% | *Duration*: **10 minutes**

**1.** Recall the definition of the subset sum *decision* problem and consider the related subset sum *search* problem.

subset sum decision problem:

**Input:** A set of positive integers $S = \{x_1, x_2, \ldots, x_n\}$ and a positive integer target $t$.

**Question:** Is there some subset of $S$ whose sum is exactly $t$?

subset sum search problem:

**Input:** A set of positive integers $S = \{x_1, x_2, \ldots, x_n\}$ and a positive integer target $t$.

**Output:** A subset of $S$ whose sum is exactly $t$, or the special value NIL if there is no such subset.

Give a detailed argument to show that the subset sum problem is polytime self-reducible. Make sure to include a brief English description of the main idea of your algorithm, to justify that your algorithm is correct, and to analyze your algorithm's running time.