COMP3821 Homework 4

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Question 1.

1.1 Nature of LP.

Since each jewellery item is discrete, the burgular cannot e.g., take 'half' a diamond ring. Thus burgular must formulate an integer LP problem. Note this is a case of an 0-1 integer LP problem.

1.2 Variables.

n items.
c_i is the value of the ith item, $1 \leq i \leq n$
w_i is the weight of the ith item.
M is the weight capacity of the backpack.
x_i is the corresponding 0-1 boolean value signifying whether an item is taken.

1.3 Constraints.

The only constraint is the weight capacity of the backpack; the total weight of looted items cannot not exceed the capacity,

$$\sum_{i=1}^{n} w_i \leq M$$

1.4 Objective.

The aim is to get the most value out of the items looted such that,

$$\sum_{i=1}^{n} c_i x_i = c_1 x_1 + c_2 x_2 + c_3 x_3 + ... + c_n x_n$$

is maximized.