Algorithms and Datastructures assignment 1

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Indhold

1 Task 1 **2**

2 Task 2 **2**

3 Task 3 **2**

4 Task 4 **2**

5 Task 5 **2**

1 Task 1

$$|N(c,i)| = \begin{cases} 0 & \text{if } c \leq 0 \\ 0 & \text{if } i = 0 \\ 1 + N(c, i-1) & \text{if } p_i = c \\ N(c - p_i, i-1) + N(c, i-1) & \text{otherwise} \end{cases}$$

2 task 2

In order to prove the correctness of our formula, for calculating the amount of unique combinations of unique beers you can buy with a specified amount of money, we will first prove the correctness of the initialization of our formula. This we have summarized into showing that for a given value of c and i, for example, $1 \leq c$ and $1 \leq i$ that our base case holds true for the first iteration.

3 Task 3

Bellow we have written the pseudo-code for MemoizedBeerComp using memoization DP

```
MemoizedBeerComp(c, i, P, R)
1 if c <= 0 or i==0
2    return 0
3 if R(c,i) > -1
4    return R(c,i)
5 if c-P(i)==0
6     R(c,i)=1+ MemoizedBeerComp(c,i-1)
7     return R(c,i)
8  else
9     R(c,i)=MemoizedBeerComp(c,i-1, P, R)+MemoizedBeerComp(c-P[i], i-1, P, R)
10   return R(c,i)
```

4 Task 4