

15-317 Homework 8

March 22, 2022

Task 1 (9 points). Consider the following Prolog program for `subsetsum`. In it, `subset(L, S)` holds when S is a subset of L and `sum(L, Acc)` holds when all the elements in L sum to Acc .

```
subsetsum(List, Sum, Subset) :-  
    subset(List, Subset),  
    sum(Subset, Sum).
```

- a. `subsetsum(+, -, +)`
- b. `subsetsum(-, +, -)`
- c. `subsetsum(+, -, -)`

Solution 1:

□

Task 2 (9 points). Consider the following Prolog program for `mergesort`. In it, `split(L, L1, L2)` holds when $L1$ concatenated with $L2$ is a permutation of L and the size of $L1$ and $L2$ differ by at most 1 and `merge(L, L1, L2)` holds when L is the sorted permutation of $L1$ concatenated with $L2$.

```
mergesort([], []).  
  
mergesort([A | []], [A | []]).  
  
mergesort(Unsorted, Sorted) :-  
    split(Unsorted, UHalf1, UHalf2),  
    mergesort(UHalf1, SHalf1),  
    mergesort(UHalf2, SHalf2),  
    merge(SHalf1, SHalf2, Sorted).
```

- a. `mergesort(+, -)`
- b. `mergesort(-, +)`
- c. `mergesort(+, +)`

Solution 2:

□