

CSI 3120

Lab 5 Report

Group #6

Carl Li 300235679

Ruoyu Liu 300176134

Roy Rui 300176548

Task A: Family Tree

Facts and Rules Defined:

- **Family Facts:** We defined `parent/2`, `male/1`, and `female/1` to represent parent-child relationships and gender in the family tree.
- **Rules Implemented:**
 - `sibling/2`: Identifies siblings by checking shared parents while ensuring that the two individuals are different.
 - `grandparent/2`: Chains `parent/2` predicates to identify grandparents.
 - `ancestor/2`: Recursively checks if one person is a descendant through multiple generations.

Test Result:

```
1 ?- [q1].
true.

2 ?- male(tom).
true.

3 ?- parent(mary, Child).
Child = ann ;
Child = fred.

4 ?- sibling(ann, Sibling).
Sibling = fred.

5 ?- grandparent(GP, fred).
GP = john ;
false.

6 ?- parent(john, Child), female(Child).
Child = mary ;
false.

7 ?- ancestor(Anc, fred).
Anc = mary ;
Anc = john.

8 ?- grandparent(john, GC), female(GC).
GC = ann ;
GC = liz.
```

Task B: Recursive List Processing

Predicate Defined:

- `sum_odd_numbers/2`: This predicate computes the sum of odd numbers in a list.
 - **Base Case**: If the list is empty, the sum is 0.
 - **Recursive Case**: If the head of the list is odd, it is added to the sum of the tail; if even, the head is skipped.

Test Result:

```
10 ?- sum_odd_numbers([1, 2, 3, 4, 5], Sum).  
Sum = 9 .  
  
11 ?- sum_odd_numbers([0, 7, 3, 8], Sum).  
Sum = 10 .  
  
12 ?- sum_odd_numbers([], Sum).  
Sum = 0.
```

Task C: Hidden Treasure Puzzle

Puzzle Solution: We defined the positions of four houses using the provided clues:

1. The red house is to the left of the blue house.
2. The green house contains the treasure.
3. The yellow house is not next to the green house.
4. The treasure is not in the second house.

Predicate Defined:

- `next_to/3`: Ensures one house is directly next to another.
- `not_next_to/3`: Ensures two houses are not adjacent.

Test Result:

```
Houses = [green, red, blue, yellow],  
GreenIndex = 1 ;  
Houses = [yellow, red, blue, green],  
GreenIndex = 4 ;
```