

## Haskell you may assume (if allowed in the question)

Basic data types:

Class / Type	Functions
Bool	&&    not
Tuple	(,) fst snd
List	[] : head tail ++ !! length take zip
Num	+ - * abs
Integral	div mod even odd
Fractional	/
Eq	== /=
Ord	> >= <= <
Show	show
Read	read
IO	getLine getChar putStr do <- return let

Basic types: Char, Int, Integer, Double

List functions:

```
List comprehension [f x | x <- list, cond x]
foldr ⊕ v [a1, a2, ..an] = a1 ⊕ (a2 ⊕ (... ⊕ (an ⊕ v)))
foldl ⊕ v [a1, a2, ..an] = (((v ⊕ a1) ⊕ a2) ⊕ ...) ⊕ an
```

```
type String = [Char]
data Maybe a = Nothing | Just a
map :: (a -> b) -> [a] -> [b]
class Functor p where
  fmap :: (a -> b) -> p a -> p b
```

## Prolog you may assume (if allowed in the question)

```
% dif(X,Y) is true if X and Y denote different individuals
% X < Y is true if expression X is less than Y
% X <= Y is true if expression X is less than or equal to Y
% X > Y is true if expression X is greater than Y
% Ordering on pairs (and tuples) is defined by the lexicographic ordering, as though
% through the clauses:
(A,_) < (B,_) :- A<B.
(A,C) < (A,D) :- C<D.
% (a,b,c) is an abbreviation for (a,(b,c))

% append(A,B,C) is true if C contains the elements of A followed by the elements of B
append([],L,L).
append([H|T],L,[H|R]) :-
  append(T,L,R).

% reverse(L,R) true if R has same elements as L, in reverse order
reverse(L,R) :-
  reverse3(L,[],R).
% reverse3(L,A,R) is true if R consists of the elements of L reversed followed by the elements of A
reverse3([],R,R).
reverse3([H|T],Acc,R) :-
  reverse3(T,[H|Acc],R).
```