Study the following ML function definitions and answer the questions below:

```ml
fun prefix [ ] [ ] = []
    | prefix (x::xs) (y::ys) = (x::y)::prefix xs ys;

fun sep [ ] = [[ ], [ ]]
    | sep [x] = [[x], [ ]]
    | sep (x::y::rest) = prefix [x,y] (sep rest);

fun merge[[ ],y] = y : int list
    | merge[x,[ ]] = x
    | merge[x::xs, y::ys] = 
        if x<y then x :: merge[ xs, y::ys]
        else y :: merge[x::xs, ys];

fun s [ ] = [ ]
    | s [x] = [x]
    | s x = merge (map s (sep x));
```

Deduce the ML type of the function `prefix` and derive the result of the call:

```
prefix [1, 2, 3] [[4], [5], [6]];
```

[2 marks]

Give a correctly-typed call to `prefix` that will generate an exception when evaluated.

[2 marks]

What values do `sep[1,2,3,4,5,6,7,8]` and `sep[1,2,3,4,5,6,7]` yield?

[4 marks]

Deduce the ML type of `merge` and explain why the omission of `: int list` would lead to an error.

[2 marks]

Give an ML definition of the standard library function `map`.

[2 marks]

Describe what the function `s` does and explain why it works.

[8 marks]