

2a). One test case that behaves differently under dynamic scoping versus static scoping is:

```
const x = 10  
const plus = function(x) {return function(y) {return x + y}};  
jsy.print(plus(1)(2))
```

With static scoping, the result would be 3 because the previously declared const x is out of scope. However, in dynamic scoping, the result is 12 because it would use the value declared for x on the first line, which is 10 instead of 1.

3d). The evaluation order is deterministic as specified in the judgement form  $e \rightarrow e'$  because it always evaluates from left to right. Step must be called on the left first and must be evaluated before the right side can be.

4). In the expression  $e1 + e2$ ,  $e1$  would be evaluated first, then  $e2$ , and then the  $+$  operator. To change the order in which it is evaluated, we could reverse the eval function so that  $e2$  is evaluated first, then  $e1$ , and the  $+$  operator is still the last to be evaluated.

5a). The  $\&\&$  operator is useful in short circuit evaluation. For example,  $a \&\& b$  will first check if  $a$  is valid, if not, it will short circuit and results in better performance since it then knows that there is no need to waste time checking the right side of the expression.

5b).  $e1 \&\& e2$  does short circuit because it first checks if  $e1$  is valid, if it isn't, it will short circuit because an AND statement cannot be true when one element is already evaluated as false.