

## CM20167 A Quiz about Lisp!

Guy McCusker

1W2.1

### Question 1: truth-valued functions

- ▶ What does the “p” in `zerop`, `listp` and `symbolp` stand for?
- ▶ What does the function `null` do? Describe its action on all possible arguments.
- ▶ What does the function `not` do? Describe its action on all possible arguments.
- ▶ Do you notice anything?

### Question 2: Lists

Consider the list

```
( ( quizzes ( are fun ) ) )
```

- ▶ Does this list have a `car`? If so, what is it?
- ▶ Does this list have a `cdr`? If so, what is it?
- ▶ Does this list have a `cadr`? If so, what is it?
- ▶ Does this list have a `cadar`? If so, what is it?

### Question 3: Evaluation

Consider the expression

```
'(car (list '(list '+ 1 2) 3 4))
```

- ▶ What does this evaluate to?
- ▶ What does the result of the above evaluate to?
- ▶ What does the result of the above evaluate to?
- ▶ What does the result of the above evaluate to?
- ▶ What does the result of the above evaluate to?

### Question 4: The empty list

Give three expressions, in three characters or fewer each, that evaluate to the empty list.

### Question 5: higher-order functions

- ▶ What does it mean to say that a function is "higher-order"?
- ▶ Recall the `filter` function: `(filter p mylist)` tests every element of `mylist` using the function `p`, and returns the list of elements that gave `t` (`true`).  
Write a function which behaves like `filter` using `foldr`.

## Question 6: currying

- ▶ What does “currying” mean, with respect to functions?
- ▶ Write a curried version of the function

```
(defun plus (a b)
  (+ a b)
)
```

## Question 7: higher-order plumbing with lambda

Consider these two functions:

```
(defun spice (f)
  (lambda (a)
    (lambda (b)
      (f a b)
    )
  )
)
```

```
(defun yoghurt (f)
  (lambda (a b)
    ((f a) b)
  )
)
```

- ▶ If myfun is a function of two arguments, what does the function (yoghurt (spice myfun)) do?
- ▶ How would you describe what spice and yoghurt are doing?