# **Different Points of View**

#### CS 1025 Computer Science Fundamentals I

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### Many points of view

- Before we dive into object-oriented programming, let's look at a couple of other points of view.
- We will take a quick look at a couple of other ways of programming and few different development environments.
- Don't worry about getting every detail at this stage, this is more just to get an impression.

### **Imperative Programming**

This is a C program to compute factorials,
 n! = n × (n – 1) × ... × 3 × 2 × 1.

```
int factorial(int n) {
    int i, prod;
    prod = 1;
    for (i = 1; i <= n; i++)
        prod = prod * i;
    return prod;
}</pre>
```

 The main things to notice are the assignments and the loop.

# **Functional Programming**

• This is a Scheme program to compute n!

- Scheme is a member of the Lisp family of languages, the first of which from about 1960.
- It uniformly uses the syntax (operator arg1 arg2 ...).
- This program uses *recursion* and the fact that, for n > 1,
   n! = n × (n 1)!

### **Uniformity vs** Convenience

 Which is better, to have convenient, but irregular syntax, like 1 + cos(theta),

or to have a completely uniform, but less convenient syntax, like (+ 1 (cos theta)).

- The irregular syntax is easier to use and the regular syntax is easier to compose.
- For single jobs a Swiss Army knife is better than a Lego brick, but how would you make a replica of the Empire State building out of Swiss Army knives.

### The Lisp family of languages

- Most things are made up of "cons" cells that contain two things.
- The things they contain can be values or pointers to other things.
- Can make complicated data structures from these.

### The Eclipse IDE for Java Development



### The DrRacket IDE for Scheme

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(define n 6)		^
(define factorial (lambda (n) (if (= n 1) 1 (* n (factorial (- n 1))))))		*
<pre>Welcome to DrRacket, version 5.1.1 [3m]. Language: R5RS [custom]; memory limit: 128 MB. &gt; (+ n n) 12 &gt; (factorial n) 720 &gt;</pre>		*
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### The Maple Environment

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 > f := sin(x^2) + cos(x);
                               f := \sin(x^2) + \cos(x)
> diff(f, x);
                                2\cos(x^2)x - \sin(x)
> fsolve(f, x);
                                  4.686736151
> fact := proc(n) if n = 1 then 1 else n*fact(n-1) fi end:
> fact(50);
           3041409320171337804361260816606476884437764156896051200000000000
> 300 1;
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