

Using Loop Controls to Compute Factorials

In lab last week, we learned how to use Do, For and While statements to sum a series of numbers. Our last class exercise asked us to use each type of statement to compute 10!

Mathematica has a built in factorial function, which is simply :

```
In[347]:= 10 !
```

```
Out[347]= 3 628 800
```

and even a double factorial :

```
In[348]:= 10 !!
```

```
Out[348]= 3840
```

(where $n!! = n (n - 2) (n - 4) \dots$).

Below are the short codes showing how to compute 10! using Do, For, While statements :

Using a **Do** Loop. (The format of a Do Loop is `Do[expr, {i, imax}`])

```
Clear[fact]  
fact = 1;  
(* This is the initialization step *)  
Do[fact = fact n, {n, 1, 10}]  
Print[fact]  
3 628 800
```

Using a **For** statement: (The format is `For[start, test, incr, body]`)

```
Clear[fact]  
For[fact = 1; i = 1, i < 11, i++, fact = fact * i]  
Print[fact]  
3 628 800
```

Note that in the code above we have two elements in the start portion of the For statement. These two elements are separated by a semi - colon. In other words, everything up to the first comma is part of start.

Using a **While** statement (* While[*test*, *body*] *)

```
Clear[fact]  
i = 1; fact = 1; While[i < 11, fact = fact * i; i++]  
Print[fact]  
3 628 800
```