Quant Methods - End of Prog Basics

Conditionals (if-then-else statements)

At end of last class we talked about how to check whether input values conform to limits for the values using an if-then type construction.

```
#calculates daylight hours for given latitude and yearday
daylighthrs = function(latitude,yearday) {

  #check input values
  if (latitude > 65 || latitude < -65) {
    print("Value of latitude is out of bounds. Use value between -65 and 65")
    break
  }
  if (days > 366 || days < 0) {
    print("Value of days is out of bounds. Use value between 0-365")
    break
  }

  latrad = latitude*pi/180 #degree  #-> radians
  solar_declination = 0.4093*sin((2*pi/365)*yearday-1.405)
  sunset_hour_angle = acos(-tan(latrad)*tan(solar_declination))
  daylight_hrs = 24*sunset_hour_angle/pi #hours in day
  return(daylight_hrs)
}
```

```
lats = 45
days = -10
#dhi = daylighthrs(lats,days)
#print(dhi)
```

```
lats = 100
days = 250
#dhi = daylighthrs(lats,days)
#print(dhi)
```

There are many ways to use conditional statements. Let's look at a simple example.

```
for (n in 1:100) {
  print (n)
  if (n > 19) break
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
## [1] 11
## [1] 12
## [1] 13
## [1] 14
## [1] 15
## [1] 16
## [1] 17
## [1] 18
## [1] 19
## [1] 20
```

Result? Count from 1 to 20. When n=20, it is > 19 and loop breaks

If else: else only evaluated if test is F

```
for (n in 1:40) {
  if (n <=19) {print (n)}
  else (print(n/2))
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
## [1] 11
## [1] 12
## [1] 13
## [1] 14
## [1] 15
## [1] 16
## [1] 17
## [1] 18
## [1] 19
## [1] 10
## [1] 10.5
## [1] 11
## [1] 11.5
## [1] 12
## [1] 12.5
## [1] 13
## [1] 13.5
## [1] 14
## [1] 14.5
## [1] 15
## [1] 15.5
## [1] 16
## [1] 16.5
## [1] 17
## [1] 17.5
## [1] 18
## [1] 18.5
## [1] 19
## [1] 19.5
## [1] 20
```

Some logical operators that can be used in tests: a. x == y tests for equality, b. <= or >= c. && or || Boolean and/or d. ! Boolean negation

e.g.:

```
x = -5
if (x>0) print(x)
if (x<0) print(x*2)
```

```
## [1] -10
```

```
x=-1
if (x < 0 && x > -3) {
  print(x)
  } else {
  print("value not between -3 and 0")}
```

```
## [1] -1
```