Intro to programming I

Week 13 - While loops

- A *while* loop is a structure that repeats a body of commands over and over as long a condition is True. The syntax of a while loop is:

```
while <condition>:  # repeat the body of the while until condition is False
    command 1
    command 2
    ....
    command n
```

- While loops offer an alternative to recursion; anything that we can solve with recursion we can also solve with while loops, and anything that we can solve with while loops we can solve with recursion. Programs that use recursion are called *recursive*; programs that use loops are called *iterative*.

- Sometimes recursive solutions are shorter than iterative ones; sometimes iterative solutions are shorter than recursive. For example, we can rewrite our recursive routine to take Karel to a wall to be shorter:

template-based recursive solution

```
def go_to_wall():
    if not(front_is_clear):
        pass
        return
    else:
        move()
        go_to_wall()
        return
```

cleaned-up recursive solution

```
def go_to_wall():
    if front_is_clear():
        move()
        go_to_wall()
```

but the iterative version is still shorter:

Iterative solution

```
while front_is_clear():
    move()
```

- Recursive functions are elegant but tend to use a lot of memory; all things being equal we should choose to write our functions iteratively.