# STAT 33B Lab Workbook Wk 9

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This workbook is due **Mar 18, 2021** by 9:00am (or Mar 19 by midnight if you attend lab).

Lab workbooks are graded for completeness, so as long as you make a clear effort to solve each problem, you'll get full credit. That said, make sure you understand the concepts here, because they're likely to reappear in homeworks, quizzes, and later lectures.

- Knit and submit the generated PDF file on Gradescope.

## For-loops

Watch the "For-loops" lecture video.

No exercises for this section.

## Loop Indices

Watch the "Loop Indices" lecture video.

No exercises for this section.

## While-loops

Watch the "While-loops" lecture video.

No exercises for this section.

## Preallocation

Watch the "Preallocation" lecture video.

No exercises for this section.

## Loops Example

Watch the "Loops Example" lecture video.

## Exercise 1

Write a function that returns the first `n + 1` positions of a 3-dimensional discrete random walk. Return the `x`, `y`, and `z` coordinates in a data frame with columns `x`, `y`, and `z`. Your function should have a parameter `n` that controls the number of steps.

*Hint: For efficiency, use vectors for* ***x****,* ***y****, and* ***z****. Wait to combine them into a data frame until the very last line of your function.*

**YOUR ANSWER GOES HERE:**

```
r3walk = function(n) {
  x = y = z = numeric(n + 1)
  xyz = sample(1:3, n, replace = TRUE)
  move = sample(c(-1, 1), n, replace = TRUE)

  for (i in seq_len(n)) {
    x[i + 1] = x[i]
    y[i + 1] = y[i]
    z[i + 1] = z[i]
    switch(xyz[i],
           { # 1 x-axis
             x[i + 1] = x[i] + move[i]
             },
           { # 2 x-axis
             y[i + 1] = y[i] + move[i]
             },
           { # 3 x-axis
             z[i + 1] = z[i] + move[i]
             })
  }
  data.frame(x, y, z)
}
# r3walk(numeric(0))
# r3walk(1:3)
r3walk(0)
```

```
##   x y z
## 1 0 0 0
```

```
r3walk(1)
```

```
##   x y z
## 1 0 0 0
## 2 1 0 0
```

```
r3walk(2)
```

```
##   x  y  z
## 1 0  0  0
## 2 0 -1  0
## 3 0 -1 -1
```

```
# r3walk(1e6)
```

## Developing Iterative Code

Watch the "Developing Iterative Code" lecture video.

No exercises for this section. All done!