

## Bootcamp Exercise: Control and Flow

Exercise 1) Write a for loop statements so that it runs from 1:9 and prints the following output to your screen:

```
•  
•  
•  
•  
•  
•  
•  
•  
•  
•
```

Exercise 2) Modify your for loop so that it prints 10 asterisks, with each asterisk separated by exactly one ampersand sign (&), with no spaces or new line characters.

```
dogs <- 10;  
for (i in 1:5){  
  dogs <- dogs + 1;  
}  
###  
meatloaf <- 0;  
for (i in 5:9){  
  meatloaf <- meatloaf - i + 1;  
  cat(meatloaf)  
}  
###  
bubbles <- 12;  
for (i in -1:-4){  
  bubbles <- i;  
}
```

Exercise 3) by hand, figure out the initial values of these variables and values at the the start and end of each iteration of the loop

```
###you can use the if statement with the modulus operator to conditionally perform operations  
years <- c( 2015, 2016, 2018, 2020, 2021)  
for(ii in 1:length(years)){  
  if(years[ii] %% 2 == 0){  
    cat(years[ii], 'Hooray, congressional elections!', sep = '\t', fill = T)  
  }  
}
```

Exercise 4) modify this code so that it will print out a message during presidential as well as congressional election years

```
bankAccounts <- c(10, 9.2, 5.6, 3.7, 8.8, 0.5);
```

Now look at the error message the following lines of code produce. Can you think of a way to modify this?

```
interestRate <- 0.0125;
for (i in 1:length(bankAccounts)) {
  compounded[i] <- interestRate*bankAccounts[i] + bankAccounts[i]; }
```

HINT: variables must be initialized before you can perform operations on them

HINT 2: look at the `rep()` function and see if you can use that to initialize a variable that will help you

Exercise 5) More fun with loops. Here are the bank accounts from seven randomly selected UCLA grad students ##### Exercise 6) Go back to the compounded interest example. Suppose we now want to compound the interest annually, but across a period of 5 years. The for loop we discussed earlier only compounds for a single year. Try this:

```
bankAccounts <- c(10, 9.2, 5.6); #define bank accounts here
interestRate <- 0.0525;
house <- c(4.8, 3.8, 5.7); #deduct
food<- c(3.5, 4.3, 5.0); #deduct
fun <- c(7.8, 2.1, 10.5); #deduct
#and incomes (through TAs) of
income <- c(21, 21, 21); #add this

for (j in 1:5) {
  for (i in 1:length(bankAccounts)) {
    #step 1 modify bankAccounts so that amounts reflect income and expenses
    #step 2 get calculate interest and add to accounts from step 1
    #you can actually use the line you have already written if you
    #modify amounts in bankAccounts directly in step 1
  }
}
```

```
house <- c(4.8, 3.8, 5.7);
food<- c(3.5, 4.3, 5.0);
fun <- c(7.8, 2.1, 10.5);

#and incomes (through TAs) of

income <- c(21, 21, 21);
```

Exercise 7) Three students have estimated annual expenditures for food, housing, and fun of: (in thousands of dollars) Modify the 5-year interest-compounding code from #5 and #6 so that it runs from 2020-2025 and so that in odd numbered years students 1 and 3 get trust fund disbursements of \$5000. (hint the modulus function `%%` will be helpful )

Exercise 8) use a while loop to sum all numbers from 1:17. You will need to use a counter variable (like index seen in class).

Exercise 9) write a function takes a number, and prints 'small' if number less than or equal to -1; 'medium' if between -1 and + 1'big' if greater than or equal to + 1