

# STAT 33B Lab 6

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This assignment is due **Apr 16, 2020** by 11:59pm.

Edit this file, knit to PDF, and:

- Submit the Rmd file on bCourses.
- Submit the PDF file on Gradescope.

If you think you'll need help with submission, please ask during the lab.

Answer all questions with complete sentences, and put code in code chunks. You can make as many new code chunks as you like. Please do not delete the exercises already in this notebook, because it may interfere with our grading tools.

As you work, you may find it helpful to be able to run your code. You can run a single line of code by pressing Ctrl + Enter. You can run an entire code chunk by clicking on the green arrow in the upper right corner of the code chunk.

Knit the document from time to time to make sure that your code runs without errors from top to bottom in a fresh R environment.

## Debugging

The purpose of this lab is to practice debugging.

The function in the next section has many bugs. Some of these bugs cause errors which show up when trying to parse the function, while others don't show up until trying to run the function. There are also "silent bugs", which will not cause errors but will lead to incorrect results.

## The Function

The `tip_calculator()` function, shown below, is meant to calculate the tip and grand total for a restaurant bill. There are multiple ways to calculate these, depending on the tip rate, tax rate, and whether the tip is on the subtotal before or after tax. The function's parameters are:

- `subtotal` - the bill before taxes are added
- `percent_tip` - the desired percentage of the tip
- `post_tax` - whether or not the tip should be calculated on the bill before or after taxes have been added.
- `percent_tax` - the tax rate

The function is defined as:

```
tip_calculator = function(subtotal, percent_tip = 0.20, post_tax = TRUE,
  percent_tax = 0.0925)
{
  tax = subtotal**percent_tax
  pre_tip = subtotal
  if(post_tax {
```

```

    pre_tip = subtotal + tax
  }
  tip = pre_tip*0.0925
  grand_total == subtotal + tax + tip

  out = c("tip" = tip "total" = grand_total)

  out
}

```

```

## Error: <text>:6:15: unexpected '{'
## 5:   pre_tip = subtotal
## 6:   if(post_tax {
##           ^

```

Your task is to find and fix each bug in the `tip_calculator()` function. Do the debugging in rounds, with one round for each bug. After fixing a bug, start a new round of debugging **in a new code cell**. You must perform at least 3 rounds of debugging, but more may be necessary to fix all of the bugs. You must use the `debug()` or `browser()` function for at least one round.

You have not fixed all of the bugs until all of the pre-written tests at the end of this lab run and return `TRUE`. Note that these tests may not be exhaustive, so you may want to add more tests of your own.

## Round 1

Describe the bug, the steps you took to find the bug, and the steps you took to fix the bug. Place the fixed code in the cell below.

```

# Your fixed code after round 1 goes here.
tip_calculator = function(subtotal, percent_tip = 0.20, post_tax = TRUE,
  percent_tax = 0.0925)
{
  tax = subtotal**percent_tax
  pre_tip = subtotal
  if(post_tax) {
    pre_tip = subtotal + tax
  }
  tip = pre_tip*0.0925
  grand_total == subtotal + tax + tip

  out = c("tip" = tip "total" = grand_total)

  out
}

```

```

## Error: <text>:13:23: unexpected string constant
## 12:
## 13:   out = c("tip" = tip "total"
##           ^

```

YOUR WRITTEN ANSWER GOES HERE: There are some missing parantheses (for instance, line 97), and those may cause setax error

## Round 2

Describe the bug, the steps you took to find the bug, and the steps you took to fix the bug. Place the fixed code in the cell below.

```

# Your fixed code after round 2 goes here.
tip_calculator = function(subtotal, percent_tip = 0.20, post_tax = TRUE,
  percent_tax = 0.0925)
{
  tax = subtotal**percent_tax
  pre_tip = subtotal
  if(post_tax) {
    pre_tip = subtotal + tax
  }
  tip = pre_tip*0.0925
  grand_total == subtotal + tax + tip

  out = c("tip" = tip, "total" = grand_total)

  out
}

```

YOUR WRITTEN ANSWER GOES HERE: There is a missing coma on line 132, and this causes syntax error as well

### Round 3

Describe the bug, the steps you took to find the bug, and the steps you took to fix the bug. Place the fixed code in the cell below.

```

# Your fixed code after round 3 goes here.
tip_calculator = function(subtotal, percent_tip = 0.20, post_tax = TRUE,
  percent_tax = 0.0925)
{
  tax = subtotal*percent_tax
  pre_tip = subtotal
  if(post_tax) {
    pre_tip = subtotal + tax
  }
  tip = pre_tip*percent_tip
  grand_total == subtotal + tax + tip

  out = c("tip" = tip, "total" = grand_total)

  out
}

```

YOUR WRITTEN ANSWER GOES HERE: The tip should be calculated as `pre_tippercent_tip` instead of `pre_tip0.0925` And tax should be calculated as `subtotal*percent_tax` instead of `subtotal**percent_tax`

### Round 4

Describe the bug, the steps you took to find the bug, and the steps you took to fix the bug. Place the fixed code in the cell below.

*Note: If you need more than 4 rounds of debugging, add them after this section.*

```

# Your fixed code after round 4 goes here.
tip_calculator = function(subtotal, percent_tip = 0.20, post_tax = TRUE,
  percent_tax = 0.0925)
{

```

```

    tax = subtotal*percent_tax
    pre_tip = subtotal
    if(post_tax) {
        pre_tip = subtotal + tax
    }
    tip = pre_tip*percent_tip
    grand_total = subtotal + tax + tip

    out = c("tip" = tip, "total" = grand_total)

    out
}

```

YOUR WRITTEN ANSWER GOES HERE: and in line 192 it should be = instead of ==

```
tip_calculator(100)
```

```
##      tip  total
## 21.85 131.10
```

## Test Cases

Below are a few calls to `tip_calculator()`. The results are assigned to variables so that they can be used in further tests below.

```
test_a = tip_calculator(100)
test_a
```

```
##      tip  total
## 21.85 131.10
```

```
test_b = tip_calculator(100, 0.15)
test_b
```

```
##      tip      total
## 16.3875 125.6375
```

```
test_c = tip_calculator(100, 0.15, FALSE)
test_c
```

```
##      tip  total
## 15.00 124.25
```

```
test_d = tip_calculator(100, 0.15, FALSE, 0.0725)
test_d
```

```
##      tip  total
## 15.00 122.25
```

Below are tests that check the correctness of the results from the previous calls.

```
# Confirm that the default tip is more than the 15% tip
test_a["tip"] > test_b["tip"]
```

```
## tip
## TRUE
```

```
test_a["total"] > test_b["total"]
```

```
## total
```

```

## TRUE
# Confirm that tipping post-tax is more than tipping pre-tax
test_b["tip"] > test_c["tip"]

## tip
## TRUE
test_b["total"] > test_c["total"]

## total
## TRUE
# Confirm that the default tax is more than the base California tax of 7.25%
test_c["total"] > test_d["total"]

## total
## TRUE
# Confirm that the grand total minus the tip is the subtotal plus tax
(test_a["total"] - test_a["tip"]) == 100 * 1.0925

## total
## TRUE
(test_b["total"] - test_b["tip"]) == 100 * 1.0925

## total
## TRUE
(test_c["total"] - test_c["tip"]) == 100 * 1.0925

## total
## TRUE
(test_d["total"] - test_d["tip"]) == 100 * 1.0725

## total
## TRUE

```