Homework 2

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Task 1: Basic Vector Practice

Question 1

```
pre = c(130, 128, 116, 124, 133, 134, 118, 126, 114, 127, 141, 138, 128,
        140, 137, 131, 120, 128, 139, 135)
post = c(114, 98, 113, 99, 107, 116, 113, 111, 119, 117, 101, 119, 130,
         122, 106, 106, 124, 102, 117, 113)
```

Question 2

```
names = paste("Subject", 1:20, sep = "_")

names(pre) = names
names(post) = names
```

Question 3

```
diff_op = pre - post

diff_op
```

```
 Subject_1  Subject_2  Subject_3  Subject_4  Subject_5  Subject_6  Subject_7
        16         30          3         25         26         18          5
 Subject_8  Subject_9 Subject_10 Subject_11 Subject_12 Subject_13 Subject_14
        15         -5         10         40         19         -2         18
Subject_15 Subject_16 Subject_17 Subject_18 Subject_19 Subject_20
        31         25         -4         26         22         22
```

Question 4

```
mean(diff_op)
```

```
[1] 17
```

Question 5

```
decreased = which(diff_op > 0)

decreased
```

```
 Subject_1  Subject_2  Subject_3  Subject_4  Subject_5  Subject_6  Subject_7
         1          2          3          4          5          6          7
 Subject_8 Subject_10 Subject_11 Subject_12 Subject_14 Subject_15 Subject_16
         8         10         11         12         14         15         16
Subject_18 Subject_19 Subject_20
        18         19         20
```

Question 6

```
positive_diff = diff_op[diff_op > 0]

positive_diff
```

```
 Subject_1  Subject_2  Subject_3  Subject_4  Subject_5  Subject_6  Subject_7
        16         30          3         25         26         18          5
 Subject_8 Subject_10 Subject_11 Subject_12 Subject_14 Subject_15 Subject_16
        15         10         40         19         18         31         25
Subject_18 Subject_19 Subject_20
        26         22         22
```

Question 7

```r
mean(positive_diff)
```

```
[1] 20.64706
```

Task 2: Basic Data Frame Practice

Question 1

```r
bp_df = data.frame(
  patient = names,
  pre = pre,
  post = post,
  diff = diff_op
)
```

Question 2

```r
bp_df[bp_df$diff < 0, ]
```

```
             patient pre post diff
Subject_9   Subject_9 114  119   -5
Subject_13 Subject_13 128  130   -2
Subject_17 Subject_17 120  124   -4
```

Question 3

```r
bp_df$normal = bp_df$post < 120


## testing
bp_df
```

```
              patient pre post diff normal
Subject_1   Subject_1 130  114   16   TRUE
Subject_2   Subject_2 128   98   30   TRUE
Subject_3   Subject_3 116  113    3   TRUE
Subject_4   Subject_4 124   99   25   TRUE
Subject_5   Subject_5 133  107   26   TRUE
Subject_6   Subject_6 134  116   18   TRUE
Subject_7   Subject_7 118  113    5   TRUE
Subject_8   Subject_8 126  111   15   TRUE
Subject_9   Subject_9 114  119   -5   TRUE
Subject_10 Subject_10 127  117   10   TRUE
Subject_11 Subject_11 141  101   40   TRUE
Subject_12 Subject_12 138  119   19   TRUE
Subject_13 Subject_13 128  130   -2  FALSE
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE
Subject_16 Subject_16 131  106   25   TRUE
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE
Subject_19 Subject_19 139  117   22   TRUE
Subject_20 Subject_20 135  113   22   TRUE
```

Question 4

```
knitr::kable(bp_df)
```

	patient	pre	post	diff	normal
Subject_1	Subject_1	130	114	16	TRUE
Subject_2	Subject_2	128	98	30	TRUE
Subject_3	Subject_3	116	113	3	TRUE
Subject_4	Subject_4	124	99	25	TRUE
Subject_5	Subject_5	133	107	26	TRUE
Subject_6	Subject_6	134	116	18	TRUE
Subject_7	Subject_7	118	113	5	TRUE
Subject_8	Subject_8	126	111	15	TRUE
Subject_9	Subject_9	114	119	-5	TRUE
Subject_10	Subject_10	127	117	10	TRUE
Subject_11	Subject_11	141	101	40	TRUE
Subject_12	Subject_12	138	119	19	TRUE
Subject_13	Subject_13	128	130	-2	FALSE

	patient	pre	post	diff	normal
Subject_14	Subject_14	140	122	18	FALSE
Subject_15	Subject_15	137	106	31	TRUE
Subject_16	Subject_16	131	106	25	TRUE
Subject_17	Subject_17	120	124	-4	FALSE
Subject_18	Subject_18	128	102	26	TRUE
Subject_19	Subject_19	139	117	22	TRUE
Subject_20	Subject_20	135	113	22	TRUE

Task 3: List practice

Question 1

```
placebo_pre = c(138, 135, 147, 117, 152, 134, 114, 121, 131, 130)

placebo_post = c(105, 136, 123, 130, 134, 143, 135, 139, 120, 124)

placebo_names = paste("Subject", 1:10, sep = "_")

diff_placebo = placebo_pre - placebo_post

bp_df_placebo = data.frame(
  patient = placebo_names,
  pre = placebo_pre,
  post = placebo_post,
  diff = diff_placebo,
  normal = placebo_post < 120
)
```

Question 2

```
bp_list = list(treat = bp_df, placebo = bp_df_placebo)
```

Question 3

```
bp_list[[1]]
```

```
             patient pre post diff normal
Subject_1   Subject_1 130  114   16   TRUE
Subject_2   Subject_2 128   98   30   TRUE
Subject_3   Subject_3 116  113    3   TRUE
Subject_4   Subject_4 124   99   25   TRUE
Subject_5   Subject_5 133  107   26   TRUE
Subject_6   Subject_6 134  116   18   TRUE
Subject_7   Subject_7 118  113    5   TRUE
Subject_8   Subject_8 126  111   15   TRUE
Subject_9   Subject_9 114  119   -5   TRUE
Subject_10 Subject_10 127  117   10   TRUE
Subject_11 Subject_11 141  101   40   TRUE
Subject_12 Subject_12 138  119   19   TRUE
Subject_13 Subject_13 128  130   -2  FALSE
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE
Subject_16 Subject_16 131  106   25   TRUE
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE
Subject_19 Subject_19 139  117   22   TRUE
Subject_20 Subject_20 135  113   22   TRUE
```

```
bp_list$treat
```

```
             patient pre post diff normal
Subject_1   Subject_1 130  114   16   TRUE
Subject_2   Subject_2 128   98   30   TRUE
Subject_3   Subject_3 116  113    3   TRUE
Subject_4   Subject_4 124   99   25   TRUE
Subject_5   Subject_5 133  107   26   TRUE
Subject_6   Subject_6 134  116   18   TRUE
Subject_7   Subject_7 118  113    5   TRUE
Subject_8   Subject_8 126  111   15   TRUE
Subject_9   Subject_9 114  119   -5   TRUE
Subject_10 Subject_10 127  117   10   TRUE
Subject_11 Subject_11 141  101   40   TRUE
Subject_12 Subject_12 138  119   19   TRUE
Subject_13 Subject_13 128  130   -2  FALSE
```

```
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE
Subject_16 Subject_16 131  106   25   TRUE
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE
Subject_19 Subject_19 139  117   22   TRUE
Subject_20 Subject_20 135  113   22   TRUE
```

```
bp_list[["treat"]]
```

```
             patient pre post diff normal
Subject_1   Subject_1 130  114   16   TRUE
Subject_2   Subject_2 128   98   30   TRUE
Subject_3   Subject_3 116  113    3   TRUE
Subject_4   Subject_4 124   99   25   TRUE
Subject_5   Subject_5 133  107   26   TRUE
Subject_6   Subject_6 134  116   18   TRUE
Subject_7   Subject_7 118  113    5   TRUE
Subject_8   Subject_8 126  111   15   TRUE
Subject_9   Subject_9 114  119   -5   TRUE
Subject_10 Subject_10 127  117   10   TRUE
Subject_11 Subject_11 141  101   40   TRUE
Subject_12 Subject_12 138  119   19   TRUE
Subject_13 Subject_13 128  130   -2  FALSE
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE
Subject_16 Subject_16 131  106   25   TRUE
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE
Subject_19 Subject_19 139  117   22   TRUE
Subject_20 Subject_20 135  113   22   TRUE
```

Question 4

```
bp_list$placebo$pre
```

```
 [1] 138 135 147 117 152 134 114 121 131 130
```

Task 4: Control Flow Practice

Question 1

```
bp_list$treat$status = character(20)
```

Question 2

```
for (i in 1:20) {
  if (bp_list$treat$post[i] <= 120) {
    bp_list$treat$status[i] = "optimal"
  } else if (bp_list$treat$post[i] <= 130) {
    bp_list$treatment$status[i] = "borderline"
  } else {
    bp_list$treatment$status[i] = "high"
  }
}

## testing
bp_list
```

```
$treat
             patient pre post diff normal  status
Subject_1   Subject_1 130  114   16   TRUE optimal
Subject_2   Subject_2 128   98   30   TRUE optimal
Subject_3   Subject_3 116  113    3   TRUE optimal
Subject_4   Subject_4 124   99   25   TRUE optimal
Subject_5   Subject_5 133  107   26   TRUE optimal
Subject_6   Subject_6 134  116   18   TRUE optimal
Subject_7   Subject_7 118  113    5   TRUE optimal
Subject_8   Subject_8 126  111   15   TRUE optimal
Subject_9   Subject_9 114  119   -5   TRUE optimal
Subject_10 Subject_10 127  117   10   TRUE optimal
Subject_11 Subject_11 141  101   40   TRUE optimal
Subject_12 Subject_12 138  119   19   TRUE optimal
Subject_13 Subject_13 128  130   -2  FALSE
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE optimal
Subject_16 Subject_16 131  106   25   TRUE optimal
```

```
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE optimal
Subject_19 Subject_19 139  117   22   TRUE optimal
Subject_20 Subject_20 135  113   22   TRUE optimal

$placebo
      patient pre post diff normal
1   Subject_1 138  105   33   TRUE
2   Subject_2 135  136   -1  FALSE
3   Subject_3 147  123   24  FALSE
4   Subject_4 117  130  -13  FALSE
5   Subject_5 152  134   18  FALSE
6   Subject_6 134  143   -9  FALSE
7   Subject_7 114  135  -21  FALSE
8   Subject_8 121  139  -18  FALSE
9   Subject_9 131  120   11  FALSE
10 Subject_10 130  124    6  FALSE

$treatment
$treatment$status
 [1] NA           NA           NA           NA           NA
 [6] NA           NA           NA           NA           NA
[11] NA           NA           "borderline" "borderline" NA
[16] NA           "borderline"
```

Question 3

```r
bp_list$placebo$status = character(10)


for (i in 1:10) {
  if (bp_list$placebo$post[i] <= 120) {
    bp_list$placebo$status[i] = "optimal"
  } else if (bp_list$placebo$post[i] <= 130) {
    bp_list$placebo$status[i] = "borderline"
  } else {
    bp_list$placebo$status[i] = "high"
  }
}
```

```
## testing
bp_list
```

```
$treat
              patient pre post diff normal  status
Subject_1   Subject_1 130  114   16   TRUE optimal
Subject_2   Subject_2 128   98   30   TRUE optimal
Subject_3   Subject_3 116  113    3   TRUE optimal
Subject_4   Subject_4 124   99   25   TRUE optimal
Subject_5   Subject_5 133  107   26   TRUE optimal
Subject_6   Subject_6 134  116   18   TRUE optimal
Subject_7   Subject_7 118  113    5   TRUE optimal
Subject_8   Subject_8 126  111   15   TRUE optimal
Subject_9   Subject_9 114  119   -5   TRUE optimal
Subject_10 Subject_10 127  117   10   TRUE optimal
Subject_11 Subject_11 141  101   40   TRUE optimal
Subject_12 Subject_12 138  119   19   TRUE optimal
Subject_13 Subject_13 128  130   -2  FALSE
Subject_14 Subject_14 140  122   18  FALSE
Subject_15 Subject_15 137  106   31   TRUE optimal
Subject_16 Subject_16 131  106   25   TRUE optimal
Subject_17 Subject_17 120  124   -4  FALSE
Subject_18 Subject_18 128  102   26   TRUE optimal
Subject_19 Subject_19 139  117   22   TRUE optimal
Subject_20 Subject_20 135  113   22   TRUE optimal

$placebo
      patient pre post diff normal     status
1   Subject_1 138  105   33   TRUE    optimal
2   Subject_2 135  136   -1  FALSE       high
3   Subject_3 147  123   24  FALSE borderline
4   Subject_4 117  130  -13  FALSE borderline
5   Subject_5 152  134   18  FALSE       high
6   Subject_6 134  143   -9  FALSE       high
7   Subject_7 114  135  -21  FALSE       high
8   Subject_8 121  139  -18  FALSE       high
9   Subject_9 131  120   11  FALSE    optimal
10 Subject_10 130  124    6  FALSE borderline

$treatment
$treatment$status
 [1] NA           NA           NA           NA           NA
```

```
 [6] NA           NA           NA           NA           NA
[11] NA           NA           "borderline" "borderline" NA
[16] NA           "borderline"
```

Task 5

Question 1

```
summary_statsitics_function = function(df_list, stat = "mean") {

  my_fun = get(stat)
  summary = c(
    my_fun(df_list$treat$pre),
    my_fun(df_list$treat$post),
    my_fun(df_list$treat$diff),
    my_fun(df_list$placebo$pre),
    my_fun(df_list$placebo$post),
    my_fun(df_list$placebo$diff)
  )
  names(summary) = paste0(stat, "_", c(
    "treat_pre_BP",
    "treat_post_BP",
    "treat_diff_BP",
    "placebo_pre_BP",
    "placebo_post_BP",
    "placebo_diff_BP"))


  return(summary)
}


# Testing Function

summary_statsitics_function(bp_list)
```

```
   mean_treat_pre_BP   mean_treat_post_BP   mean_treat_diff_BP
              129.35               112.35                17.00
 mean_placebo_pre_BP mean_placebo_post_BP mean_placebo_diff_BP
              131.90               128.90                 3.00
```

```r
summary_statsitics_function(bp_list, stat = "var")
```

```
   var_treat_pre_BP   var_treat_post_BP   var_treat_diff_BP  var_placebo_pre_BP
           64.55526            74.76579           153.68421           149.87778
var_placebo_post_BP var_placebo_diff_BP
          124.98889           341.33333
```

```r
summary_statsitics_function(bp_list, stat = "sd")
```

```
   sd_treat_pre_BP   sd_treat_post_BP   sd_treat_diff_BP  sd_placebo_pre_BP
          8.034629          8.646721          12.396944          12.242458
sd_placebo_post_BP sd_placebo_diff_BP
         11.179843          18.475209
```

```r
summary_statsitics_function(bp_list, stat = "min")
```

```
   min_treat_pre_BP   min_treat_post_BP   min_treat_diff_BP  min_placebo_pre_BP
                114                  98                  -5                 114
min_placebo_post_BP min_placebo_diff_BP
                105                 -21
```

```r
summary_statsitics_function(bp_list, stat = "max")
```

```
   max_treat_pre_BP   max_treat_post_BP   max_treat_diff_BP  max_placebo_pre_BP
                141                 130                  40                 152
max_placebo_post_BP max_placebo_diff_BP
                143                  33
```