Programming in Base R

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:

```
sub_name <- paste("Subject", 1:20, sep = "_")

pre_name <- matrix(c(sub_name, pre),
                   nrow = 20,
                   ncol = 2)

post_name <- matrix(c(sub_name, post),
                   nrow = 20,
                   ncol = 2)
```

Question 3:

```
diff_op <- pre - post
diff_op
```

```
 [1] 16 30  3 25 26 18  5 15 -5 10 40 19 -2 18 31 25 -4 26 22 22
```

Question 4:

```
mean(diff_op)
```

```
[1] 17
```

Question 5:

```
(which(diff_op >= 0))
```

```
 [1]  1  2  3  4  5  6  7  8 10 11 12 14 15 16 18 19 20
```

Question 6:

```
sub_name[(which(diff_op >= 0))]
```

```
 [1] "Subject_1"  "Subject_2"  "Subject_3"  "Subject_4"  "Subject_5"
 [6] "Subject_6"  "Subject_7"  "Subject_8"  "Subject_10" "Subject_11"
[11] "Subject_12" "Subject_14" "Subject_15" "Subject_16" "Subject_18"
[16] "Subject_19" "Subject_20"
```

Question 7:

```
mean((which(diff_op >= 0)))
```

```
[1] 10.05882
```

Task 2: Basic Dataframe Practice

Question 1:

```r
df <- data.frame(sub_name = sub_name,
                 pre_bp = pre,
                 post_bp = post,
                 diff_bp = diff_op)
```

Question 2:

```r
df[c(9, 13, 17),]
```

```
     sub_name pre_bp post_bp diff_bp
9   Subject_9    114     119      -5
13 Subject_13    128     130      -2
17 Subject_17    120     124      -4
```

Question 3:

```r
df$post_cat <- NA

for (i in 1:nrow(df)){
 if (df$post_bp[i] < 120) {
   df$post_cat[i] <- "TRUE"}
}
```

Question 4:

```r
knitr::kable(df)
```

sub_name	pre_bp	post_bp	diff_bp	post_cat
Subject_1	130	114	16	TRUE
Subject_2	128	98	30	TRUE
Subject_3	116	113	3	TRUE
Subject_4	124	99	25	TRUE
Subject_5	133	107	26	TRUE
Subject_6	134	116	18	TRUE

sub_name	pre_bp	post_bp	diff_bp	post_cat
Subject_7	118	113	5	TRUE
Subject_8	126	111	15	TRUE
Subject_9	114	119	-5	TRUE
Subject_10	127	117	10	TRUE
Subject_11	141	101	40	TRUE
Subject_12	138	119	19	TRUE
Subject_13	128	130	-2	NA
Subject_14	140	122	18	NA
Subject_15	137	106	31	TRUE
Subject_16	131	106	25	TRUE
Subject_17	120	124	-4	NA
Subject_18	128	102	26	TRUE
Subject_19	139	117	22	TRUE
Subject_20	135	113	22	TRUE

Task 3: List Practice

Question 1:

```
sub_name_new <- paste("Subject", 1:10, sep = "_")

pre_new <- c(138, 135, 147, 117, 152, 134, 114, 121, 131, 130)

post_new <- c(105, 136, 123, 130, 134, 143, 135, 139, 120, 124)

diff_bp_new <- pre_new - post_new

df_new <- data.frame(sub_name = sub_name_new,
                     pre_bp = pre_new,
                     post_bp = post_new,
                     diff_bp = diff_bp_new)


df_new$post_cat <- NA

for (i in 1:nrow(df_new)){
 if (df_new$post_bp[i] < 120) {
   df_new$post_cat[i] <- "TRUE"}
}
```

Question 2:

```
bp_list <- list(treatment = df, placebo = df_new)
```

Question 3:

```
bp_list$treatment
```

```
     sub_name pre_bp post_bp diff_bp post_cat
1   Subject_1    130     114      16     TRUE
2   Subject_2    128      98      30     TRUE
3   Subject_3    116     113       3     TRUE
4   Subject_4    124      99      25     TRUE
5   Subject_5    133     107      26     TRUE
6   Subject_6    134     116      18     TRUE
7   Subject_7    118     113       5     TRUE
8   Subject_8    126     111      15     TRUE
9   Subject_9    114     119      -5     TRUE
10 Subject_10    127     117      10     TRUE
11 Subject_11    141     101      40     TRUE
12 Subject_12    138     119      19     TRUE
13 Subject_13    128     130      -2     <NA>
14 Subject_14    140     122      18     <NA>
15 Subject_15    137     106      31     TRUE
16 Subject_16    131     106      25     TRUE
17 Subject_17    120     124      -4     <NA>
18 Subject_18    128     102      26     TRUE
19 Subject_19    139     117      22     TRUE
20 Subject_20    135     113      22     TRUE
```

```
bp_list[1]
```

```
$treatment
     sub_name pre_bp post_bp diff_bp post_cat
1   Subject_1    130     114      16     TRUE
2   Subject_2    128      98      30     TRUE
3   Subject_3    116     113       3     TRUE
4   Subject_4    124      99      25     TRUE
```

```
5   Subject_5    133     107      26     TRUE
6   Subject_6    134     116      18     TRUE
7   Subject_7    118     113       5     TRUE
8   Subject_8    126     111      15     TRUE
9   Subject_9    114     119      -5     TRUE
10 Subject_10    127     117      10     TRUE
11 Subject_11    141     101      40     TRUE
12 Subject_12    138     119      19     TRUE
13 Subject_13    128     130      -2     <NA>
14 Subject_14    140     122      18     <NA>
15 Subject_15    137     106      31     TRUE
16 Subject_16    131     106      25     TRUE
17 Subject_17    120     124      -4     <NA>
18 Subject_18    128     102      26     TRUE
19 Subject_19    139     117      22     TRUE
20 Subject_20    135     113      22     TRUE
```

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

```
     sub_name pre_bp post_bp diff_bp post_cat
1   Subject_1    130     114      16     TRUE
2   Subject_2    128      98      30     TRUE
3   Subject_3    116     113       3     TRUE
4   Subject_4    124      99      25     TRUE
5   Subject_5    133     107      26     TRUE
6   Subject_6    134     116      18     TRUE
7   Subject_7    118     113       5     TRUE
8   Subject_8    126     111      15     TRUE
9   Subject_9    114     119      -5     TRUE
10 Subject_10    127     117      10     TRUE
11 Subject_11    141     101      40     TRUE
12 Subject_12    138     119      19     TRUE
13 Subject_13    128     130      -2     <NA>
14 Subject_14    140     122      18     <NA>
15 Subject_15    137     106      31     TRUE
16 Subject_16    131     106      25     TRUE
17 Subject_17    120     124      -4     <NA>
18 Subject_18    128     102      26     TRUE
19 Subject_19    139     117      22     TRUE
20 Subject_20    135     113      22     TRUE
```

Question 4:

```
bp_list[[2]][2]
```

```
   pre_bp
1     138
2     135
3     147
4     117
5     152
6     134
7     114
8     121
9     131
10    130
```

Task 4: Control Flow Practice

Question 1:

```
df$status <- character(20)

df_new$status <- character(10)
```

Question 2:

```
for (i in 1:nrow(df)){
  if (df$post_bp[i] <= 120) {
    df$status[i] <- "optimal"
  } else if (df$post_bp[i] > 120 & df$post_bp[i] <= 130) {
    df$status[i] <- "borderline"
  } else if (df$post_bp[i] > 130)
    {df$status[i] <- "high"}
}
```

Question 3:

```
for (i in 1:nrow(df_new)){
  if (df_new$post_bp[i] <= 120) {
    df_new$status[i] <- "optimal"
  } else if (df_new$post_bp[i] > 120 & df_new$post_bp[i] <= 130) {
    df_new$status[i] <- "borderline"
  } else if (df_new$post_bp[i] > 130)
    {df_new$status[i] <- "high"}
}
```

Task 5: Function Writing

Question 1:

```
bp_func <- function(bp_list, stat = "mean"){
  treatment <- bp_list[[1]]
  placebo <- bp_list[[2]]

  my_fun <- get(stat)

   values <- c(
    my_fun(treatment$pre_bp, na.rm = TRUE),
    my_fun(treatment$post_bp, na.rm = TRUE),
    my_fun(treatment$diff_bp, na.rm = TRUE),
    my_fun(placebo$pre_bp, na.rm = TRUE),
    my_fun(placebo$post_bp, na.rm = TRUE),
    my_fun(placebo$diff_bp, na.rm = TRUE)
  )

  names <- c(
    paste0("treatment_pre_", stat),
    paste0("treatment_post_", stat),
    paste0("treatment_diff_", stat),
    paste0("placebo_pre_", stat),
    paste0("placebo_post_", stat),
    paste0("placebo_diff_", stat)
  )
```

```
  names(values) <- names
  return(values)
}

bp_func(bp_list)
```

```
 treatment_pre_mean treatment_post_mean treatment_diff_mean    placebo_pre_mean
             129.35              112.35               17.00              131.90
  placebo_post_mean   placebo_diff_mean
             128.90                3.00
```