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:

```
subject_names <- paste("Subject", 1:20, sep = "_")
names(pre) <- subject_names
names(post) <- subject_names
subject_names
```

```
 [1] "Subject_1"  "Subject_2"  "Subject_3"  "Subject_4"  "Subject_5"
 [6] "Subject_6"  "Subject_7"  "Subject_8"  "Subject_9"  "Subject_10"
[11] "Subject_11" "Subject_12" "Subject_13" "Subject_14" "Subject_15"
[16] "Subject_16" "Subject_17" "Subject_18" "Subject_19" "Subject_20"
```

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:

```
post_treatment_bp <- which(diff_op > 0)
post_treatment_bp
```

```
 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:

```
only_pos_change <- diff_op[diff_op > 0]
only_pos_change
```

```
 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:

```
mean_pos_decrease <- mean(only_pos_change)
mean_pos_decrease
```

```
[1] 20.64706
```

Task 2: Basic Data Frame Practice

Question 1:

```
df_bp <- data.frame(patient = subject_names, pre_bp = pre,
                    post_bp = post, diff_bp = diff_op)
```

Question 2:

```
subset(df_bp, diff_bp < 0)
```

```
             patient pre_bp post_bp diff_bp
Subject_9   Subject_9    114     119      -5
Subject_13 Subject_13    128     130      -2
Subject_17 Subject_17    120     124      -4
```

Question 3:

```
df_bp$post_120_below <- df_bp$post_bp < 120
```

Question 4:

```
knitr::kable(df_bp)
```

```
Warning: 'xfun::attr()' is deprecated.
Use 'xfun::attr2()' instead.
See help("Deprecated")

Warning: 'xfun::attr()' is deprecated.
Use 'xfun::attr2()' instead.
See help("Deprecated")
```

	patient	pre_bp	post_bp	diff_bp	post_120_below
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

Task 3: List Practice

Question 1:

```r
pre_placebo <- c(138, 135, 147, 117, 152, 134, 114, 121, 131, 130)
post_placebo <- c(105, 136, 123, 130, 134, 143, 135, 139, 120, 124)

subject_names_placebo <- paste("Subject", 1:10, sep = "_")
diff_placebo <- pre_placebo - post_placebo
```

```r
post_120_below_placebo <- post_placebo < 120

bp_df_placebo <- data.frame(patient = subject_names_placebo,
                            pre_bp = pre_placebo, post_bp =
                              post_placebo, diff_bp = diff_placebo,
                            post_below_120 = post_120_below_placebo)
```

Question 2:

```r
bp_list <- list(treatment = df_bp, placebo = bp_df_placebo)
```

Question 3:

```r
bp_list[1]
```

```
$treatment
             patient pre_bp post_bp diff_bp post_120_below
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[[1]]
```

	patient	pre_bp	post_bp	diff_bp	post_120_below
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$treatment
```

	patient	pre_bp	post_bp	diff_bp	post_120_below
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_bp
```

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

Task 4: Control Flow Practice

Question 1:

```
df_bp$status <- character(20)
bp_df_placebo$status <- character(10)
```

Question 2:

```
for (i in 1:20) {
  bp <- bp_list$treatment$post_bp[i]

  if (bp <= 120) {
    bp_list$treatment$status[i] <- "optimal"
  } else if (bp <= 130) {
    bp_list$treatment$status[i] <- "borderline"
  } else {
    bp_list$treatment$status[i] <- "high"
  }
}
```

Question 3:

```
for (i in 1:10) {
  bp <- bp_list$placebo$post_bp[i]

  if (bp <= 120) {
    bp_list$placebo$status[i] <- "optimal"
  } else if (bp <= 130) {
    bp_list$placebo$status[i] <- "borderline"
  } else {
    bp_list$placebo$status[i] <- "high"
  }
}
```

Task 5: Function Writing

Question 1:

```
summary_stats <- function(df_list, stat = "mean") {

  my_fun <- get(stat)

  treat <- df_list[[1]]
  placeb <- df_list[[2]]

  treat_pre <- my_fun(treat$pre)
  treat_post <- my_fun(treat$post)
  treat_diff <- my_fun(treat$diff)

  placeb_pre <- my_fun(placeb$pre)
  placeb_post <- my_fun(placeb$post)
  placeb_diff <- my_fun(placeb$diff)

  result_values <- c(treat_pre, treat_post, treat_diff,
                     placeb_pre, placeb_post, placeb_diff)

  stat_names <- paste(stat, c("treat_pre", "treat_post",
                              "treat_diff",  "placebo_pre",
                              "placebo_post", "placebo_diff"), sep = "_")
```

```
  names(result_values) <- stat_names

  result_values
}
```