# Programming
# Homework 1
# Due Date: 18:00 October 17, 2019

1. Use `seq()` and `rep()` to write codes for the following questions:
   (a) Construct a vector as the same output as:

   1 2 3 4 5 2 3 4 5 6 3 4 5 6 7 4 5 6 7 8 5 6 7 8 9

   (b) Construct a vector as the same output as:

   1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5

   (c) Construct a vector as the same output as:

   0 0 0 0 0 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4

   (d) Let `more.color` be defined as follows.

   ```
   > more.colors <- c("red", "yellow", "blue", "green", "magenta", "cyan")
   ```

   Use `more.color`, `seq()`, and `rep()` to create a vector as follows:

   "red" "yellow" "blue" "yellow" "blue" "green"

   "blue" "green" "magenta" "green" "magenta" "cyan"

   Give the name "`color.vec`" to this created vector.

   (e) According to (d), how many colors in `color.vec`?

   (f) According to (d), how many times does each color appear in `color.vec`?

   (g) Rearrange the order in `color.vec` by letting the first letter from z to a.

2. Use `seq()`, `rep()`, and vector calculation in R to write codes for the following questions. (Do not use "for loop".)
   (a) Calculate the values of $\sum_{j=1}^{n} j^2$ when $n$ = 200, 400, 600, 800.

   (b) Calculate the values of $n(n+1)(2n+1)/6$ when $n$ = 200, 400, 600, 800.

   (c) Check if the values of (a) and (b) are the same. (The output should show either TRUE or FALSE.)

3. `score0 <- c(81.2, 89.6, 64.2, 91.3, 77.4, 84.5, NA, 91.7, 63.5, 84.8, NA, 87.8, 87.9, 80.9, 74.8, 64.3, 78.7, 91.3, 76.9, 74.9, 87.6, 88.4)`
   (a) Typing `mean(score0)` and `max(score0)`, what results do you get?

   (b) How to modify `mean()` and `max()` so that you can get the numeric answers?

   (c) Delete `NA` from the vector `score0` and assign the name `score1` to the new vector. What do you get if you type `mean(score1)` and `max(score1)`? Are the answers the same as those in (b)?

   (d) If I obtain two scores, 67.2 and 89.5, try to change the values in `score0` from `NA` to `67.2` and `89.5`, and assign the name `score2` to the new vector.

   (e) What do you get if you type `mean(score2)` and `max(score2)`?