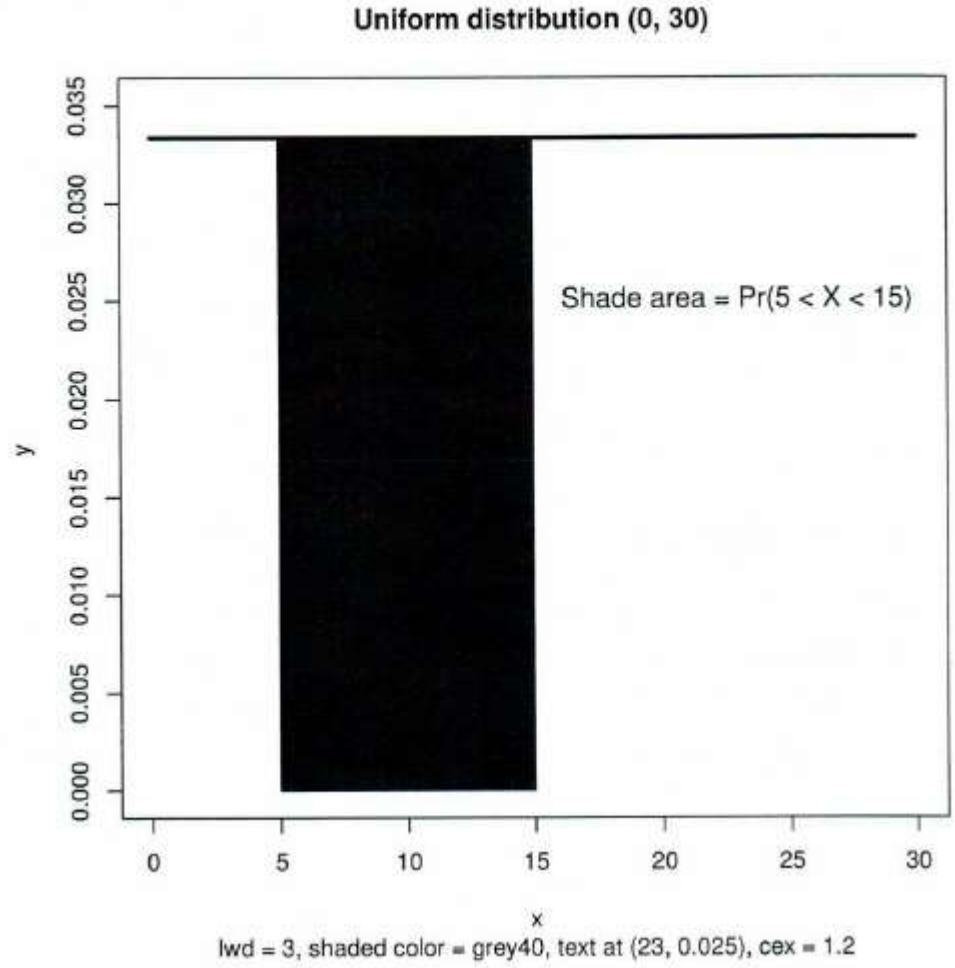
Live Session 05 Assignment

Practice more graphics and writing functions in R

Question 01

Plot a graph in R which looks exactly like the following graph.



lwd = 3, shaded color = grey40, text at (23, 0.025), cex = 1.2

Question 02

In base 7, the digits 0 to 6 are used. A number like 125 means $1 \times 7^2 + 2 \times 7 + 5$, just like base 10 but with 10's replaced by 7's.

a. When you count in base 7, you start 0, 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 14, 15, 16, 20, etc. Write a function in R called `p7` (which takes one argument n) that will print the first n numbers in base 7. For example,

```
> p7(5)
[1] 0 1 2 3 4
> p7(15)
[1] 0 1 2 3 4 5 6 10 11 12 13 14 15 16 20
> p7(52)
[1] 0 1 2 3 4 5 6 10 11 12 13 14 15 16 20 21 22 23 24
[20] 25 26 30 31 32 33 34 35 36 40 41 42 43 44 45 46 50 51 52
[39] 53 54 55 56 60 61 62 63 64 65 66 100 101 102
```

b. Write a function in R called base10to7 (which takes one argument x) that will convert a decimal number to base 7. To keep it simple, you can consider that x must be a scalar. For example, a decimal number $100 = 2 \times 7^2 + 0 \times 7^1 + 2 \times 7^0 = 202$ (base 7), the output of the function is

```
> base10to7(100)
[1] 202
```

c. Write a function in R called base7to10 (which takes one argument y) that will convert a base 7 number to decimal. To keep it simple, you can consider that y must be a scalar. For example, the output of the function for $y = 202$ is

```
> base7to10(202)
[1] 100
```

d. Can the functions you have written in **a.** – **c.** be generalized to base k ($k = 2, 3, \ldots$) instead of base 7? If yes, please show how you can do it.

Remark: Scores will be given based on the following criteria:

- Correctness of the code/program – Functions should produce correct results.
- Programming style – Logical flow and efficiency of the program, name of variables, etc.
- Documentation – Comments in the program to describe what the program doing.

Tip: Do the part b first then do the part a and part c.

Submit your final code as a txt file in Live session assignment 5 tab.