# Program 9 - Queues

**100 points**

**IMPORTANT**
You must write your code while carefully following the "IT 179 Program Grading Guidelines" described in the file **posted with Program 1**.

**Set-Up**
Create a new Java project named: **`P9`**. Next, inside the created Java project **`P9`**, create a Java package.

**Objective:** Practice with queues.

**Important**

Please read Sections 4.5 to 4.7 (pages 177 – 196 in the 3rd Edition) and watch the video posted in the folder **Week 9** before you start working on this assignment.

An operating system assigns jobs to print queues based on the number of pages to be printed (less than 10 pages, less than 20 pages, or more than 20 pages but less than 50 pages). To simplify the design, you may assume that the system has **ONE printer** that is able to print 10 pages per minute. Smaller print jobs are printed before larger print jobs, and print jobs of the same priority are queued up in the order in which they are received.

Write a program that simulates processing 30 print jobs of varying lengths using the system's printer. Your program will store the print jobs in **three queues** based on the number of pages. Queue 1 is for print jobs of a length <= 10 pages, Queue 2 is for print jobs of a length between 11 and 20 pages, Queue 3 is for print jobs of a length >= 21 pages.

The overall logic of the program is as follows:

```
While (the number of print jobs <= 30 or there are still print jobs in any of the 3 queues)
{
        Wait 1 minute
        if (the number of print jobs already generated <= 30) {
            Generate a new print job
            Insert the new job in the proper queue
          }
        If (the printer is idle) {
            Determine the next job to be submitted to the printer
            Submit the selected job to the printer
              /* and remove it from its queue */
        }
}
```

**Explanation:**

1. Each minute, your program generates a print job of a random number of pages between 10 and 50. Print jobs will have numbers: 1, 2, 3, etc. When a new job is generated, you should print out a message:

   **`New print job #X with #Y pages`**

2. The program then inserts the new job in the proper queue (based on the number of pages to be printed). Your program should then print out this message:

   **`Print job #X inserted in Queue #Z`**

   (Z being 1, 2, or 3)

3. When the program submits a job #X to the printer, it must print out a message:

   **`Print job #X is being submitted to the printer`**

4. When the program determines that the printer has finished printing out a given job #X, it must print out this message:

   **`Print job #X is done`**

**To Be Submitted**

Please zip your Java project in a file called P9.zip and submit to ReggieNet before the due date.

Grading will be in accordance with the Program Grading Criteria provided on the Important Resources page on ReggieNet.