Exam Instructions

1. Read the problem carefully.

2. Write some code to solve the problem, observing the following guidelines:
   - Write in either Java, C/C++, or Python.
   - For your convenience, a skeleton Java project has been included.
     - Do not modify the interface files.
     - Please use the same class names if you submit in a different language.
   - Do not use any third-party libraries except for testing frameworks such as JUnit.
   - We will compile and execute your code, so bugs will be noticed.

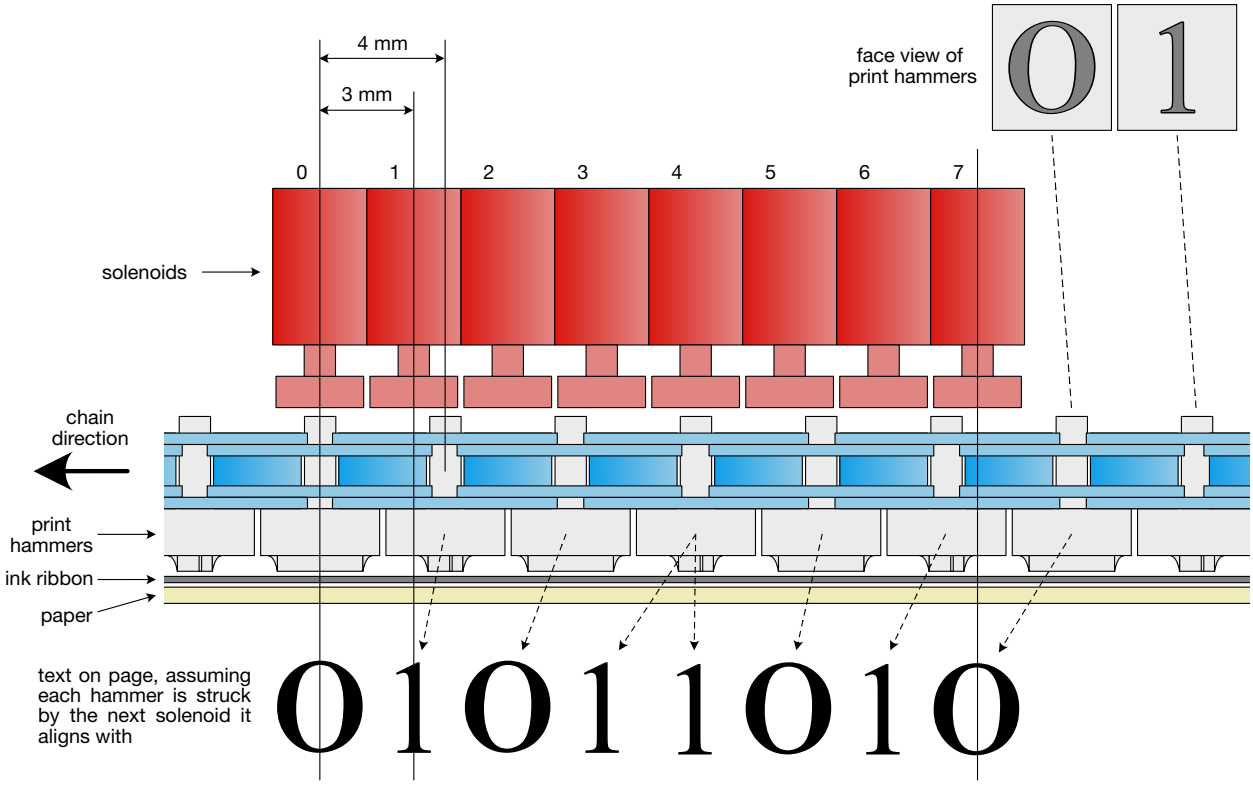
3. Include a text file with answers to the following questions:
   - What assumptions did you make?
   - Given more time, what further work would you do?

4. Package all files in a ZIP file and submit it.

Good luck!

Chain Printer

Illustrated below is a mechanism which can print eight binary digits per line. The printer has eight solenoids that strike print hammers, thus driving an inked ribbon into the paper. Striking the hammers dead-centre results in monospaced text with a character spacing of three millimetres. The print hammers have alternating '0' and '1' symbols circulating on a continuous chain. The chain is driven by a stepper motor and advances one millimetre per step. On each step, two of the print hammers line up directly with solenoids. The diagram shows the initial state where solenoids 0 and 4 line up.



The printer driver has the following software interface:

`void fire(int solenoidIndex)`	Fires the specified solenoid, returning immediately.
`void step()`	Waits for all solenoids to finish firing, then advances the chain one step (1 mm) to the left. Returns after the chain has advanced.
`void linefeed()`	Advances the paper feed by one line, returning after the paper has advanced.

Tasks

Complete as many as you can.

1. Write a method that accepts a string, prints it, and advances to the next line. The method signature is:

```
/**
 * Outputs a string to the printer and moves to the next line.
 *
 * @param line  A string containing '0', '1' and ' ' characters.
 *              Other characters are left blank.
 *              The string is truncated to the line width.
 */
void println(String line)
```

2. Write a debug version that prints '0' for unsupported characters.

```
void dprintln(String line)
```

3. The solenoids can strike the hammers one millimetre off-centre, allowing character spacing to be varied. Write a method which prints the digits proportionally such that:
   - Successive '1's are spaced 2 mm apart
   - Successive '0's are spaced 3 mm apart
   - '0's are spaced 3 mm from '1's
   - Unsupported characters are left blank

```
void pprintln(String line)
```