

# CS 370: Problem Set 1

Section: TR 10-11:50 am

Total: 150pts Due: 02/11/2016

## **Instructions:**

1. I leave plenty of space on each page for you. If you need more sheet, please attach your work right behind the corresponding problem. Most of the problems are designed for you to think about the models and the principles.
2. The first assignment has two parts, written part (20pts each question) and programming part (50pts).
3. Submission:
  - (a) If you are doing the homework as a pair, please inform me in advance and designate one person as the contact window
  - (b) On the due day, please submit a hard copy of the written part at the beginning of the class and submit your code through blackboard.

**First Name:**

**Last Name:**

**Group ID:**

**Score:**        /

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## Problem 1 Software Process: Requirements

Suggest why it is important to make a distinction between developing the user requirements and developing system requirements in the requirements engineering process.

(a) User Requirement:

(b) System Requirement:

## Problem 2 Software Process Models

Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process models (**plan-driven, incremental and reuse-oriented**) that might be used as a basis for managing the development of the following systems:

(a) A system to control anti-lock braking in a car

(b) A virtual reality system to support software maintenance

(c) A university accounting system that replaces an existing system

(d) An interactive travel planning system that helps users plan journeys with the lowest environmental impact

**Problem 3 Agile: Principles**

Explain how the principles underlying agile methods lead to the accelerated development and deployment of software.

## Problem 4 Agile: User Involvement

It has been suggested that one of the problems of having a user closely involved with a software development team is that the ‘go native’. That is, they adopt the outlook of the development team and lose sight of the needs of their user colleagues. Suggest three ways how you might avoid this problem and discuss the pros and cons of each approach.

(a) Approach 1:

(b) Approach 2:

(c) Approach 3:

## Problem 5 Software Process: Requirement

The software processes are specification, development, verification & validation, evolution. The first stage is to get the story/requirements from the clients. As practiced in class, we had a case regarding patient prescription. If we look at **Problem 1**, there are user requirements and developing system requirements. Apparently for the same customer requirements, there are various solutions (different system implementation using different software packages). Let suppose your task now is to do the specification part of software processes. Please analyze the user story as shown in the slides, cut them into various tasks (and sub-tasks) (client requirements), and further discuss what it takes to finish each tasks (system requirements).

## Problem 6 Programming: Ruby

As practiced in class that we learned how to do a simple guessing game. Write a class, name `MathObject`, which has the following three functions:

(a) Write a function `guess_game(a)` where  $a$  is the random number range (upper bound, as seen in the `MJ.rb`). That is (i) the system ask for user to input the range (ii) from that range the system randomly generates a number (iii) the user has to guess the number. Simply modify the `MJ.rb` file to do so. (10pts)

(b) Write a function `fib(n)` that yields the first  $n$  Fibonacci numbers in sequence and returns `nil`. For instance, `fib(4)` would spit out 1, 1, 2, 3, `nil`. And please avoid using recursion. (15pts)

(c) Write a function `countPath(a, b, c, d)` where  $a, b, c, d$  are arbitrary integers given by the users. The `countPath` counts how many paths there are to go from coordinate  $(\min(a, b), \min(c, d))$  to  $(\max(a, b), \max(c, d))$ , provided one can only either go up by 1 or go right by one for each step. For instance, from (1,3) to (3,5), there are 6 paths to do so. (25pts)