SE 101: Introduction to the Methods of Software Engineering
Quiz #1

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October 10, 2002   10:30 a.m.
30 min.

The only aid allowed is an electronic calculator that cannot store notes. No texts or notes are permitted. Questions appear on both sides of each page.

1. (2 marks) Explain to a non-technical person what the discipline of software engineering is all about. Restrict your answer to 2-3 sentences.

   Engineering of software systems.
    Study of how to develop quality software, on time, and within budget.
    Study of all the activities performed to develop a software system, from initial idea to final product.
    Application of engineering principles, practices, and process to the development of software products.
    Systematic (quantitative?) processes for developing and maintaining software systems.

2. (3 marks) Consider the following CPM arrow diagram:
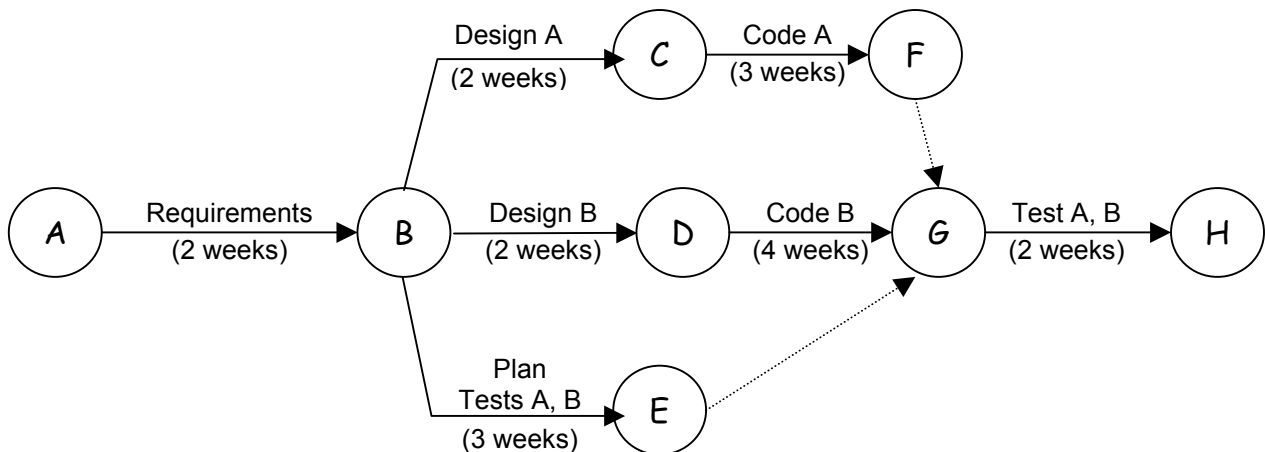
    a) Which sequence of activities constitute the critical path?
       A, B, D, G, H

    b) What is the earliest event time (EE) for event F?
       7 weeks

    c) What is the latest event time (LE) for event F?
       8 weeks

3. (3 marks) Name the seven phases of the Software Engineering waterfall process model.
>Requirements
>Specification
>Architectural Design
>Detailed Design
>Implementation
>Testing
>Maintenance

4. (2 marks) Name a Software Engineering process model other than the waterfall model. Give one advantage it has over the waterfall model.
>Concurrent Engineering – faster time to market
>Spiral Model – incremental development of product; can prototype increments to customer; can better withstand unstable requirements
>Extreme Programming – incremental development of product; can prototype increments to customer; can better withstand unstable requirements

5. (2 marks) An airline has a quadratically increasing fee structure for transporting oversized suitcases, where it charges $0.05 for every half kilogram above 70 kg squared:

$$f(w) = .05((w\text{-}70) / 2)^2$$

The airline's scale is accurate to within ± 0.5 kg. If a suitcase weighs 100 kg, what is the nominal fee for transporting the suitcase on this airline (to the correct number of significant digits)?

$$.05((100\text{-}70) / 2)^2 = \$11 \text{ (two significant digits)}$$

I didn't purposely create a formula that mixed addition with multiplication, thereby complicating how you should use the text's simple rules for determining the number of significant digits. But given that most realistic examples do combine addition and multiplication, you're likely to encounter this type of problem again. Here is a simple test you can use to check whether your result has the correct number of significant digits: calculate the minimum and maximum possible error, and match that range of uncertainty with the error range inferred by the result's significant digits:

$$.05((100.5\text{-}70/2)^2 = \quad \$11.63$$
$$.05((99.5\text{-}70/2)^2 = \quad \$10.88$$

$$\cong \$11 \pm \$.50$$

6. (3 marks) Consider the following sentence and displayed list.

   At it's meeting last night, the neighbourhood association discussed
   - a proposal for an express bus between Kitchener and the universities.
   - the by-law that requires 75 m between lodging houses.
   - who to contact to report violations of the noise by-law
   - Mrs. Abbott suggested that at least one of the members from the association attend the City Council meeting at which plans for the new library would be discussed.

   Which of the following changes would correct *errors* or *ugliness* in the above sentence and list? Check *any* change that would improve the sentence or list.
   - ✓ Remove the apostrophe in the word "it's".
   - ❑ Add a colon after the word "discussed".
   - ❑ Start every list entry, except the last entry, with a lowercase letter.
   - ✓ Make every list entry a sentence fragment.
   - ✓ Make every list entry a sentence.
   - ✓ Remove any period that ends a list entry that is not a sentence.

7. (7 marks) For each of the following sentences, indicate whether or not it contains a punctuation or number-spelling error. If the sentence contains an error, show how to fix the error.

   a) Five teams completed in the most recent scunt. (error)

   b) Both Susie's and Jen's boyfriends play on the football team. (error)

   c) Seeing that there were only two apples in the refrigerator, Jianwei decided it was time to go grocery shopping.   (no error)

   d) The Humane Society cancelled its charity run last Saturday because of rain; instead, they will hold a charity dance on Valentine's Day. (error)

   e) Even though more first-year students than expected entered Waterloo this Fall, there were almost a hundred empty beds in Residence as of last week. (error)

   f) Lucy looked dismally at her diet lunch: eight carrot sticks; three high-fibre crackers; and a glob of low-salt, low-fat hummus. (no error)

   g) I've been told that, assuming all goes well, the new Co-operative Studies building will open in January. (error)

h) Tomorrow, Chris's biology class will dissect earthworms. (error)

8. (Extra Credit) (3 marks) Consider the scenario described in problem 5, except that you also know that the standard error in the scale's measurements is ± 0.2 kg. What is the expected error in a fee assessment for a 100 kg suitcase? (Full credit for deriving the formula correctly.)

$$= \sqrt{\left({}^{.05}\!/_4 \left(2w - 140\right)^2\right)\Big|_{w=100} \cdot 0.2^2}$$