

# SE 101: Introduction to the Methods of Software Engineering

## Quiz #2

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November 7, 2002 10:30 a.m.  
30 min.

Student Name: \_\_\_\_\_  
Student ID: \_\_\_\_\_  
Student Block: \_\_\_\_\_

No aids, texts, or notes are permitted. Questions appear on both sides of each page.

1. (3 marks) What are the six (6) admission requirements for entering the engineering profession in Ontario?

Have Canadian citizenship or permanent residence  
Be 18 years old or older  
Satisfy the academic requirements (e.g., graduating from a CEAB-accredited program)  
Satisfy the work experience requirements  
Be of good character, as evidenced by reference letters  
Pass the professional practice exam

2. (5 marks) Give an example of an engineering activity and a software system that, together, would fall under the definition of “practice of professional engineering”. Explain, using the legal definition of “practice of professional engineering,” why your example falls under the definition.

(2 marks) for example: Designing, composing, evaluating, advising, reporting, directing, or supervising the construction of a medical device, transportation system, nuclear power plant, aeronautical system, etc.  
(3 marks) for explanation

3. (3 marks) Why is it considered unethical if a student accepts a job offer and then turns it down in favour of another job?

Accepting a job offer is a commitment that should be honoured. When a student accepts a job offer, he/she should withdraw any outstanding applications he/she sent to other potential employers. If the student is more interested in a job for which he/she has yet to receive an offer, then he/she should wait to hear from the other employer before accepting the offer that is in hand.

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Questions 4-5 all refer to the following 12-bit floating-point–representation scheme: the leftmost bit represents the sign of the number, the next 5 bits represent the exponent, and the 6 rightmost bits represent the fractional part of the significand. That is, all floating-point representations have the form

$$s \ e_1e_2e_3e_4e_5 \ b_1b_2b_3b_4b_5b_6 \ \text{which represents number } \pm 1.b_1b_2b_3b_4b_5b_6 \times 2^E$$

where bit string  $b_1b_2b_3b_4b_5b_6$  represents the fractional part of the significand and the hidden bit  $b_0$  is not stored in the word because it always has value 1. The exponent  $E$  ranges from  $-15$  to  $15$ , where bit string  $00000$  represents exponent  $-15$ , bit string  $00001$  represents exponent  $-14$ , ..., and bit string  $11111$  represents exponent  $16$ .

4. (4 marks) What is the *machine epsilon* (i.e., the value of the gap between the smallest representable number greater than 1 and the number 1) of the floating-point–representation scheme described above?

$$(1.000001 \times 2^0) - 1 = 1/64 - 1 = 1/64$$

$$2^{-(p-1)} = 2^{-6} = 1/64$$

5. (4 marks) What is the *smallest positive integer* that CANNOT be represented *exactly* in this floating-point representation scheme?

$$1.0000001 \times 2^7 = 129$$

6. (4 marks) Suppose you are involved in a team project and one of your team members is not attending team meetings and is not doing his or her fair share of the work. For *two of the three* of the conflict-management techniques listed below, (1) describe the conflict-management technique, and (2) give an example of how you would professionally use this technique in the above situation.

**Confrontation:** (1/General description) Find a (probably new) solution to the conflict that satisfies all parties. (1/Description in terms of situation) Find a way for the errant team member to participate that satisfies both the team's needs and the member's special circumstances. (2) Approach the team member, explain that his/her behaviour is not acceptable, listen to his/her explanation for his/her behaviour (i.e., determine root cause), and explore with him/her other solutions to the root problem.

**Force:** (1/General description) Force the conflict to be resolved in one's own favour. (1/Description in terms of situation) Find a way to force the errant team member to increase his/her participation. (2) Make errant team member feel guilty/Threaten to tell the professor/Threaten to tell the rest of the class that errant team member is not a team player.

**Smooth:** (1/General description) Resolve the conflict in favour of the other person. (1/Description in terms of situation) Allow the errant team member to continue to not do his/her fair share of the work. (2) Complete project without confronting or complaining to errant team member.

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7. (14 marks) Each of the following sentences has bad or ugly sentence structure. Show how to fix each sentence by marking up the provided text; you don't need to re-write the sentence.
- a. The project leader felt it necessary to cancel the meeting and reschedule ~~# the meeting~~ for after midterm season.
  
  - b. Over the last 20 years, the rich have gotten richer while the poor ~~are getting~~ **have gotten** poorer.
  
  - c. Gossiping in the boys' bathroom, Alice overheard Tom and Graham talk about who Marvin would take to the Math Grad Ball.  
  

**Alice overheard Tom and Graham gossiping in the boys' bathroom about who Marvin...**
  
  - d. The first-year Software Engineering curriculum consists of mathematics, science, and elementary computing; it ~~will~~ **also includes** an introductory course in digital hardware.
  
  - e. In his school uniform, the girls thought Eric looked particularly handsome.  
  

**The girls thought Eric looked particularly handsome in his school uniform.**
  
  - f. Suzy begged to watch her favourite television show after dinner, but her mom didn't like ~~that~~ **Suzy to beg**.  
Suzy begged to watch her favourite television show after dinner, but her mom didn't like ~~that~~ **Suzy to see that show**.
  
  - g. For his birthday, Sam asked his father to take him to dinner and ~~to go~~ to the movies.

BONUS QUESTION #1 (3 marks) What is the earliest year that University of Waterloo's Software Engineering program can be accredited? Explain why.

**2006. A program cannot be accredited until it has graduates, and the first class of Software Engineering students doesn't graduate until 2006.**

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BONUS QUESTION #2 (3 marks) What is the *second smallest positive integer* that CANNOT be represented *exactly* in this floating-point representation scheme (i.e., what is the smallest positive integer that is greater than your answer to question 5 and that CANNOT be represented exactly)?

$$1.0000011 \times 2^7 = 131$$