

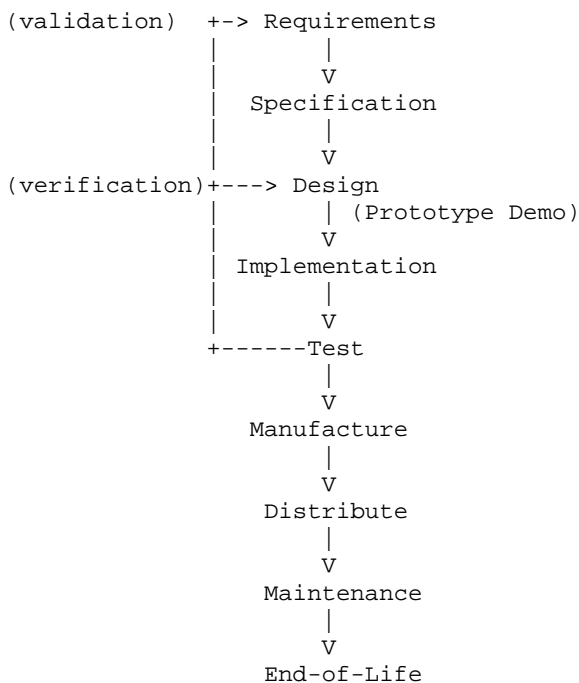
>>> SOLUTIONS <<<

Welcome to your 10% mini-exam for Senior Project. You have 75 minutes for the exam. The exam is "anything on a dead tree is allowed" as a reference. That is, you may have anything with you on paper including copies of old exams, your notes, your book, and so on. You may not share material or give help during the exam. If you copy your answer directly out of the textbook (or some other source), be sure to properly "quote" the answer (otherwise it is assumed that any answer is given in your own words). Read the last sentence again. Failure to correctly cite copied answers will cost you points. There are six questions each worth 16 points and one extra credit question worth 10 points. Please use a separate sheet of paper for each question, do not write on the back of any sheet of paper, and submit your exam with this cover sheet as the topmost sheet and the problem sheets following in number order. You get 4 points for just following these instructions correctly

**Use of a laptop for completing the exam:** These problems require a lot of writing. If you are like me, you can type better than you can write by hand. So, I will allow you to use your laptop to type the answers to this exam. At the end of 75 minutes I will ask you to hand-in to me your thumb drive with your exam file (name the file with your last name). We will then go up to my office and print-out your exam (and return the thumb drive to you). It is your responsibility to make sure your file is properly saved and not "eaten by the computer". During the exam you may only have your word processor open to your exam answers file, and nothing else. You will be asked to turn-off the wireless (WiFi) in your laptop. The exam will be proctored from the back of the room. Anyone opening-up a Web browser or otherwise displaying a file that is not the exam solution text will receive a zero for the exam.

**Problem #1**

Sketch the product development process as we have discussed and followed it in this class.



1 point for each item and transition

(yup... you can pretty much copy this from all previous old tests. Just by copying it, maybe you learned it just a little bit better!)

## **Problem #2**

Answer the following two questions on project documentation:

- a) Describe the key attributes of a requirements document, specification document, and test plan as discussed in class. That is, explain the purpose of each document and what it must contain. For the test plan, describe also the key components of a test case.

1 point each item – must state purpose of document

The purpose of the requirements document is to address “what is the problem”. The requirements document should pay attention to who the user is, cost, reliability, performance, and time to market. Each item in a requirements document must be measurable and numbered (and listed in priority order).

The purpose of the specification document is to address “how to solve the problem”. The specification should contain precise descriptions of inputs, outputs, and transformations – in short, everything measurable in a product should be covered in the specifications document. A specification document must contain a traceability matrix that traces specification items to requirement items.

The purpose of the test plan is to address “is the problem solved”. The test plan should contain a description of how test cases were selected and descriptions of test cases. The key components of a test case are 1) traceability to requirements and/or specification item, 2) system configuration, 3) exact input, 4) exact expected output.

- b) Describe the necessary components, or ingredients, of a press release.

A press release must contain the 5 Ws and 1H (who, when, where, what, and why, and how), and it must contain a user quote.

1 point each item

- c) Finish (fill in the blanks of) the following quote from Brooks MMM, “Only when one writes do the \_gaps\_ appear and the \_inconsistencies\_ protrude.”

2 points each item

## **Problem #3**

Answer the following questions about design.

- a) What is Engineering Design?

The full legal definition of design (from the Florida Administrative Code) is:

1 point each keyword

“Engineering Design” shall mean that the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. Central to the process are the essential and complementary roles of synthesis and analysis. This definition is intended to be interpreted in its broadest sense. In particular the words “system, component, or process” and “convert resources optimally” operate to indicate that sociological, economic, aesthetic, legal, ethical, etc., considerations can be included.”

The key words are underlined above.

- b) Describe the design process (i.e., the steps in design) as discussed in class.

There is no single best design process, but in class we discussed the following step-by-step process as one possible way to approach design:

1) Understand the problem (what are the objectives and assumptions?)

2) Do background research (what have others done?)

1 point each item

3) Brainstorming to list all possible solutions, but evaluate none

- 4) Choose the best solution
- 5) Build or model the solution
- 6) Analyze the solution (feedback and iterate to step (4))
- 7) Test the solution
- 8) Ship it

c) What are the four reasons for a peer design review?

Four reasons are:

- 1) Feedback to improve the design
- 2) Education to others (employees, customers, etc.)
- 3) Evaluation of employees
- 4) For contractual reasons

1 point each item

#### **Problem #4**

2 points each

Answer the following questions in one or two sentences each. All of these questions come from MMM.

a) What does Brooks think of the man-month as a unit for measuring the size of a job?

“... is a dangerous and deceptive myth. It implies that man and months are interchangeable.” (page 16)

b) Where in the book does it suggest that it is possible to have individual differences between high and low performances in the order of a magnitude?

See opening quote on page 29 attributed to Sackman, Erikson, and Grant.

c) What does Brooks mean by the “architecture of a system”?

He means “the complete and detailed specification of the user interface.” (page 45).

d) What is the “Second-System Effect”

This is the general tendency to over-design the second system ... “The result, as Ovid says, is a ‘big pile’”. (page 55).

e) Why did the Tower of Babel fail according to Brooks?

The project lacked “communication, and its consequent, organization.” (page 74).

f) What is a milestone according to Brooks?

“Milestones must be concrete, specific, measurable events, defined with knife-edge sharpness.” (page 154)

g) How old is the idea of top down design?

Brooks cites a 1971 paper by Niklaus Worth, so about 35 years old!

h) What is the purpose of a PERT chart in very simple terms?

A PERT chart “shows who waits for what.” (page 156)

### **Problem #5**

Grade is based on an understanding of what a silver bullet is and a solid argument/explanation of the answer.

Brooks describes a silver bullet as a technology or method that "slays" the essential difficulties of software development. It is not quite a silver bullet. Imagine a magic compiler that can compile natural language (say, English) into executable code. Assume that this compiler can figure-out any ambiguities present in a natural language. Would this compiler be a silver bullet? Why or why not?

The answer can be "yes", "no", or even both. The answer must be carefully explained and argued for full credit.

First, we need to understand what a silver bullet is. A silver bullet is a technology or method that "slays" the essential difficulties of software development. Essential is "the specification, design, and testing of this conceptual construct, and not the labor of representing it and testing the fidelity of the representation." (Brooks, MMM, page 182). No programming language – even natural language – can reduce this essence. A programming language can only reduce the difficulty of representation; this is an accidental not essential difficulty of software development.

So, the answer would be "no" if we assume that the natural language is simply a replacement for a programming language. That is, I now describe my implementation in English rather than C or Java or whatever. In this case, all the essential difficulties (of conceptual construction) still exist.

The answer could be "yes" if we assume that the magic compiler can compile concepts (described in natural language) into machine code. For example, if I can say "Write an application that will solve all the accounting problems in my company" and out comes machine code to do this... then we have a silver bullet in hand!

### **Problem #6**

According to the USF Career Center, what are the "Components of an Effective Resume"? As a Computer Engineering major, which component(s) do you think are the most important?

The components according to the handout/presentation for the USF Career Center are:

- Identifying information
- Career Objective
- Education
- Experience (paid and unpaid)
- Activities and honors
- Computer Skills and Language Skills
- References

1 point each and 8 points for importance

As a Computer Engineering major, skills (and experience to back them up) are perhaps the most important. Skills should be highlighted immediately after the Education section.

### **Extra Credit**

The guest speakers all shared "career success" and "interview tips" kinds of advice. I found the advice from our last speaker – Steve Baigrie at CAE – to be the most succinct and best overall. What was the advice given by Steve?

Steve's advice was:

- Focus on getting best possible grades
- Be confident
- Be organized, responsible, and accountable
- Be a team player
- Communicate well
- Don't be afraid to seek help
- Research companies that you want to work for
- Find a job that holds your interest
- Work hard, try to learn something new everyday

1 point each item