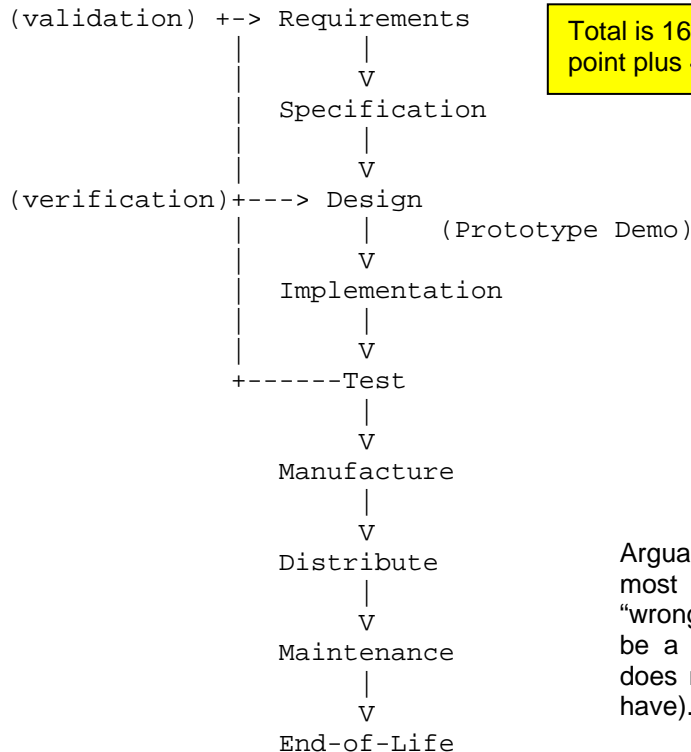


>>> SOLUTIONS <<<

Welcome to the Mini-Exam for *Senior Project*. Read each problem carefully. There are six required problems (each worth 16 points - you get 4 points for following these instructions correctly). There is also an additional extra credit question worth 10 points. This is a take home exam. Please complete this exam in one sitting (and hopefully not in more than two hours time). You are allowed to use any references you wish (yes, including google) – however, you may not communicate with others students in this class or, indeed, anyone else about this exam. That is, you are to complete this exam by yourself. In general, I do not like take home exams because they create too many ethical conundrums (and also some students think they need to spend 50+ hours on the exam to squeeze-out every last fractional nano-point). Is talking on the telephone about the exam cheating? Is sharing notes cheating? If you think that everyone else is cheating then must you do so also to not be unfairly left behind? In the real world (a world we have talked much about in this class) it is often very easy to cheat (say, copying code) with little chance of a short-term hit (but the probability of a long-term hit is high) – so you will have to learn to deal with these kinds of conundrums on multiple dimensions. My choice was to lose a good guest speaker or make this exam a take home. I chose the latter – I hope that this was a good choice for all. **Please submit your completed exam to me by Friday midnight – email is fine.** Good luck and have fun.

Problem #1

The first question is always the same, so here it is... Sketch the development process as used in this class. Answer the following... which is the most important step and why?



Total is 16 points. Each item missing is worth 1 point plus 4 points for requirements answer.

Arguably, the Requirements step is the most important – if you get this step “wrong” much of the subsequent work may be a waste of time (that is, your artifact does not solve the problem that it should have).

Problem #2

2 points off for each missing item

Exactly state the Florida Administrative Code legal definition of Engineering Design. Either write it by hand or type it word for word (do not copy and paste it). Underline the key words and/or phrases as discussed in class. Circle any grammatical errors.

“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.

Problem #3

4 points for each item

Answer the following short questions that come from the from MMM and class lecture.

- a) What is the organization of the ideal programming team according to Brooks? Describe the players. The system developed is a product of how many of the minds in this team?

Brooks uses the model of a surgical team – small, with one decision make (“the system is a product of one mind – or at most two”), and with supporting members. In this ideal programming team we have a chief programmer, a “co-pilot”, administrator (the people manager), editor, two secretaries, program clerk, toolsmith, tester, and a language lawyer.

- b) What is Brooks most famous for (writing MMM is not the answer)? How old was he when he accomplished this?

Brooks is probably most famous for being the “father of the IBM System/360” in the early 1960s. Brooks was born in 1930, so he was in his early 30s (just a few years out from his PhD) when he was the manager of this very important project – the project that basically made IBM into the leading company in the computing field.

- c) According to Brooks, what are the key documents for “building a machine”? How do these documents relate to the class deliverables documents? What document is notably missing in Brooks’ list of documents?

The key documents according to Brooks are Objectives, Specification, Schedule, Budget, Organization chart, space allocation, and estimate/forecast/prices. The Objectives is our Requirements. The Specification is our Specification. The Schedule is more-or-less our class outline. The other documents really do not apply to our projects. Notably, Brooks has no test plan.

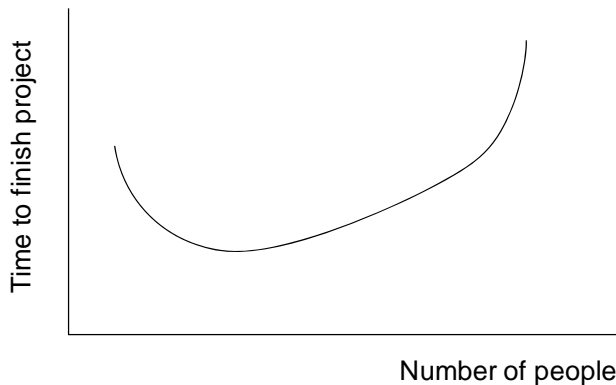
- d) There are two things that are important (that is, that count a lot for your grade) in the test plan that you submit in this class – what are these two things? Describe them carefully.

The two things are 1) the student knows how to describe a test case and does so for one or two test cases, and 2) the student knows how to select test cases as appropriate for their project. Test case selection includes understanding what are best, worst, typical, and corner cases. Certainly, a traceability matrix is needed at the end.

Problem #4

12 points for correct graph, 4 points for explanation

The Mythical Man Month is a “ghost” that lurks within every project that has a manager who wants to finish and ship the product faster (and who would not want to ship a product faster?). Consider a medium to large sized software and/or hardware project. Sketch a graph with the abscissa being the number of people and the ordinate being the time to completion of a project (from the project initiation). So, the graph should show the time to finish the project as a function of the number of people. Explain your graph. What are the key messages (and there is more than one) from this graph?



The time decreases as more people are added to the project up to a point and then it begins to increase. The decrease is a result of improved productivity from partitioning the project – the increase in time is due to reduced productivity caused by communications overhead between people. At some point the productivity may go to zero as the only thing anyone does is communicate and no work is done.

There are two key messages in this graph – one is the obvious in-the-book MMM message of adding people to a late project makes it later (that is, productivity is decreased when too many people are working on the project). The other message, which is not explicitly in the MMM book is that there is an optimum number of people for a project – finding this optimum is a challenge!

Problem #5

1 point for each quote

The following are quotes (if not exact, then very close) from our guest speakers. Identify the speaker or company who said each quote.

- “Always flip it to a positive”
- Career Center speakers
- “Remember, you are replaceable”
- Sealund speakers
- “Defense red switch network – designed here”
- Raytheon
- “Be confident, but don’t want to be cocky”
- CAE
- “What job do you want? – Worst possible answer is ‘I am willing to do anything’”
- Raytheon
- “You need more than 8% headroom for a processing spike to not lose data”
- Nielsen
- “Try to think outside of yourself”
- Sealund speakers

- h) “If you are unhappy where you work, then make a change either in where you work or in yourself”
- Nielsen
- i) “I am thrilled to get paid to do what I like to do”
- Nielsen
- j) “Be able to establish relationships”
- Lockheed-Martin
- k) “Good measurement build credibility”
- Nielsen
- l) “All about marketing yourself – can others rely upon you?”
- Nielsen
- m) “If you’ve already done it, they (government) will lower the risk”
- CAE
- n) “If you can’t measure it, you can’t improve it or manage it”
- Nielsen
- o) “Be organized, responsible, accountable”
- CAE
- p) “Don’t neglect your humanities”
- Lockheed-Martin

Problem #6

8 points for trivia, 16 for a good question. Must have a solution (8 points).

Design your own exam question for this course and answer it (correctly, of course). A good test question should be one that is focused on an important concept or knowledge item (as opposed to trivia – and I will admit that some of the items in Problem #5 above may be considered trivia) and should require some effort and/or thinking. A good test question serves two purposes, 1) measuring student knowledge, and 2) having the student learn something. Your test question should not be copied from one of the previous exams – its needs to be of your own making.

Full credit to be given only for a really insightful question.

Extra Credit

Need to have a measure for improvement and not just a change.

Identify the one thing you think needs improvement the most in this course. Explain why improvement is needed. Describe the changes that should be made to achieve this improvement. A good answer will be something reasonably feasible (but, please do feel free to “blue sky” think... I want to see your creativity here in addressing things that need improvement).

Full credit to be given only for more-or-less feasible and well reasoned suggestions with a measure of improvement.