

>>> SOLUTIONS <<<

Welcome to your 10% mini-exam for Senior Project. You have 60 minutes for the exam. The exam is open book and notes, but you may not receive or give help from or to another person during the exam. You may have with you anything on paper (your notes, books, copies of the old exam solutions from the course website, etc.). You may not use any electronic aids (e.g., a laptop WiFi'ed to the Internet is not legal). 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. There are four questions each worth 25 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.

Some thing new... these problem 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 you laptop to type the answers to this exam. At the end of 60 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). Let's see how this works. It is your responsibility to make sure your file is properly saved and not "eaten by the computer".

Problem #1

You have 60 minutes for this exam. Please take about 15 minutes and write a crisp summary of Brooks' *Mythical Man Month* book.

MMM is a short book on the subject of software project management. This book is based on Fred Brooks' experience as the development manager for the IBM OS/360 operating system in the mid 1960s. The key premise of the book – and the genesis of the title – is that adding people to a late project will only make it later. This is largely due to the communications overhead caused by adding people to a project. People and months are not interchangeable for a software project. The book describes many practices of effective development including incremental development, prototyping (throw the first one away), project organization, team organization, project documentation, and program documentation. Fred Brooks advocates strongly for one leader in a team and an "aristocratic" approach to design (one designer to control the concepts). In the "No Silver Bullet" paper included in the book Brooks' argues that the complexity in programming is inherent and not accidental, and thus the likelihood is very low of a 10x improvement (the "silver bullet") in productivity. The final two chapters of the book summarize the key material in the book (a "Cliffs Notes") and revisits after 20 years (in the anniversary issue of the book published in 1996) "what was right when written, and still is."

Grading rubric: 10 pts for main premise of book, 10 pts for overview of book topics, 5 pts for discussion of No Silver Bullet or other focused topic summary.

Problem #2

A key component of this course – of any engineering product development – is design. Precisely define engineering design.

From the Florida Administrative Code (61G15-18011): (2) “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.

Grading rubric: 3 pts for each of above underlined key points (or close synonyms of each).

Problem #3

Discuss the trade-offs between having too little and too much “process” in a development organization. A process is a formal procedure with clearly defined steps, rules, and so on that you must follow. Think about what you have heard from our guest speakers as well as your own experience with our class development process.

Process is like many things where a little is good but too much is bad. Process gives structure and organization to a team developing a product. Process lets management easily follow the progress of product development and to intercede with additional resources if and when needed in order to keep the product on schedule. Process also allows for building-in quality (e.g., with formal reviews) and for measurement of team members for consideration of raises or dismissal. Too much process, however, can stifle creativity and actually slow (or stop) product development progress. With too much process all available time is spent on “paperwork” and otherwise counterproductive work. Truly creative people may find it difficult (that is “stifling”) to work in an environment with too much process. With no process, in theory all time is available for creativity and working on the product. However with lack of direction and focus it is possible for a product development to become unproductive, deadlock over some issue, become totally oblivious to customer requirements and schedule, and/or simply “go in circles”.

Grading rubric: The general idea of a trade-off between structure and creativity is key to this answer (10 pts). Also important is to identify that too much process can actually stop progress (10 pts). General ideas of tracking and focus should be covered (5 pts).

Problem #4

What advice you would give to students in this class in the next semester? Make a list of things the students 1) should do and 2) should not do. I will create an actual list to give to the students next semester from the answers you give here.

Many answers are possible. A good answer must clearly list “should do” and “should not do” items.

Grading rubric: 20 pts for almost anything, 25 pts for insightful answers.

Extra Credit

What is the most interesting thing you learned in our guest talks? What is the most valuable thing you learned in our guest talks?

Many answers are possible. A good answer will show insight.

Grading rubric: 5 pts for anything, 10 pts for insightful answers.