1. (7 pts.) What is CORBA and what is its purpose? What became of it and why?

2. a. (2 pts.) What, according to Sommerville, is “the most important development that has affected distributed systems in the past few years”?

b. (3 pts.) Coulouris identifies “openness” as an advantage of using a distributed approach to systems development. What exactly does “openness” mean in this context?

c. (4 pts.) What, according to Sommerville, is the advantage of the two-tier, thin-client model over the two-tier, fat-client model? Under what circumstances does this advantage become a major issue? Be specific.
3. (14 pts.) Match each application or description below to the **SINGLE MOST APPROPRIATE** type of architecture among the following. (Note: architecture types may apply to none, one, or more than one application or description.)

A. two-tier client/server (C/S) architecture with thin clients  
B. two-tier client/server (C/S) architecture with fat clients  
C. multi-tier client/server (C/S) architecture  
D. distributed component architecture  
E. peer-to-peer architecture (P2P)  
F. software as a service (SaaS)  
G. service-oriented architecture (SOA)  
H. master-slave architecture

___ An approach to structuring a software system as a set of separate, stateless services that may entail multiple providers and may be distributed.  
___ Example would be:

![Diagram](image1)

___ Well know examples include web-based mail systems such as Yahoo! and Gmail, and office application such as Google docs.  
___ Example would be:

![Diagram](image2)

___ This architecture has the advantage of being highly redundant and therefore both fault-tolerant and tolerant of nodes disconnecting from the network.  
___ Provides functionality on a remote server with client access through a web browser. The server maintains the user’s data and state during an interaction session. Transactions are usually long (e.g., editing a document).  
___ Browsing the Web is the most common example of a situation where this architecture is used.  
___ Applications with relatively stable end-user functionality used in an environment with well-established system management

(continued on next page)
3. (cont’d)

Example would be:

Appropriate for computationally intensive applications for which it is possible to separate the processing required into a large number of independent computations (e.g., protean “folding at home”).

Example would be:

Examples of systems employing this architecture include Freenet, ICQ, and Jabber.

Example would be:
4. (10 pts.) Match each description below to the **SINGLE MOST APPROPRIATE AOSE RELATED TERM** among the following. (Note: terms may apply to none, one, or more than one description.)

A. advice  
B. scattering  
C. knotting  
D. aspect  
E. core concerns  
F. braiding  
G. join point  
H. knitting  
I. tangling  
J. join point model  
K. guidance  
L. pointcut  
M. cross-cutting concerns  
N. feature  
O. weaving  
P. scrambling

____ A statement, included in an aspect, that defines where advice should be woven into a program

____ Aspect code implementing a concern

____ Requirements such as those associated with quality of service issues that apply to a system as a whole rather than those associated with the primary functional services a system provides

____ Occurs when a module in a system includes code that implements different system requirements

____ The set of events that may be referenced in a pointcut

____ Functional requirements that directly relate to a system’s primary purpose

____ Occurs when the implementation of a concern is dispersed across more than one component in a program

____ Act of combining objects, methods, and aspects to create an executable program

____ An abstraction designed to encapsulate functionality associated with a cross cutting concern

____ An event in an executing program where the advice associated with an aspect may be executed

5. (3 pts.) What is the P-CMM and what is its purpose?
6. (4 pts.) Sommerville describes Maslow’s human needs hierarchy as “being helpful up to a point” in explaining what motivates people, but feels there is a specific problem with it. Which one of the following best describes this problem? (Circle ONE only.)

a. He feels that Maslow’s model does not adequately account for the fact that people can be motivated through helping a group achieve shared goals.

b. He feels that “the opportunity for self-actualization and establishing satisfying relationships in the workplace are perhaps the most important contributors to motivating team members.”

c. In large projects, team members spend a smaller proportion of their time in development activities (supported by development tools) and more time communicating (with one another) and understanding other parts of the system. Development tools, Sommerville argues, make no difference to this.

d. He feels Maslow does not adequately consider the importance of allowing people to fully experience what life has to offer outside the workplace. (Sommerville quips that “all work and no play does much more harm than simply making Jack a dull boy.”)

e. He feels that “praise from immediate managers, leadership attention (for example, one-on-one conversations), and a chance to lead projects or task forces” are even more effective motivators than meeting the needs identified by Maslow.

7. (4 pts.) Sommerville notes that the 1990’s “Bootstrap project” (Haase, Kuvaja, et al.), which uses the SEI’s maturity levels, had the goal of addressing a particular shortcoming of the SEI process maturity model. What specific shortcoming did it attempt to address?

a. It extended and adapted the SEI maturity model to make it applicable across a wider range of companies (i.e., more applicable to companies that are NOT US defense contractors).

b. It extended the SEI maturity model by identifying processes, such as customer-supplier processes, that cut across maturity levels. As the level of maturity increases, the performance of these cross-cutting processes must also improve.

c. It reduced the SEI maturity model’s exclusive focus on plan-driven development by incorporating iterative development and processes which reduce overhead and increase responsiveness to changing customer requirements.

d. It added a finer-grained capability profile to the SEI maturity model that considers individual or groups of practices and assesses their use. The advantage of this extension is that organizations can pick and choose process areas to improve according to their local needs.

e. Haase, et al., suggested extending the SEI maturity model to include recommended (“advisory”) practices that may be used, but are not obligatory.
8. (4 pts.) What, according to Sommerville, “is likely to be the most cost-effective process improvement strategy” for small to medium-sized projects?

a. Adopting agile development practices.

b. Using the GQM approach.

c. Validating requirements to ensure that the resulting product will perform as intended in the user’s environment, using multiple techniques as appropriate.

d. Performing causal analysis of selected defects and other problems and proposing actions to address them.

e. Establishing and maintaining an organizational policy for planning and performing the project planning process.

f. Employing a process management and maturity-based approach.

g. Adopting plan-driven development practices.

h. (None of the above)

9. (10 pts.) Consider the following statements related to the CMMI process improvement framework. Circle either “true” or “false” as (most) appropriate. To compensate for random guessing, your score in points will be 2 times the number of [correct minus incorrect] answers, or 0 – whichever is greater. Therefore, if you are not more than 50% sure of your answer, consider skipping the problem.

a. The continuous CMMI model allows an organization’s process capability to be assessed and assigned a maturity level from 1 to 5.  
   true  false

b. CMMI assessments involve directly examining the processes employed during a randomly selected on-going project and rating these on a six-point scale.  
   true  false

c. CMMI generic goals and practices are NOT technical but are associated with the institutionalization of good practice.  
   true  false

d. The result of a staged CMMI model assessment is a capability profile showing each process stage and its associated process capability assessment.  
   true  false

e. The CMMI identifies desirable organizational states (goals) that are associated with each of 22 process areas relevant to software process capability and improvement.  
   true  false
10. (4 pts.) As discussed in class, two common measures of software product reliability are “mean time to system failure” and “probability of no system failure in a specified time interval”. Based on Sommerville’s definition of process reliability, which one of the following would be the most appropriate measure of this process attribute? (Circle ONE only.)

a. Probability that the process can continue in spite of a process error

b. Mean development time to the discovery of a process error

c. Probability that a process error can be avoided or trapped before it results in a product error

d. Mean time required for the process to evolve in order to reflect changing organizational requirements or identified process improvements

e. Probability of no process error in a specified development time interval

On my honor, I have neither given nor received unauthorized aid on this exam and I pledge not to divulge information regarding its contents to those who have not yet taken it.

_____________________
SIGNATURE