

**Faculty of Arts and Science
University of Toronto**

Midterm Test

Department: Computer Science
Instructor: Steve Easterbrook
Date and Time: None (this is a sample paper only)

Conditions: Closed Book
Duration: 50 minutes

This test counts for 20% of your final grade

Name: _____
(Please underline last name)

Student Number: _____

Question Marks

1 _____/20

2 _____/20

3 _____/20

4 _____/20

Total _____/80 = _____%

1. [Short Questions; 20 marks total]

(a) [Software Architectures – 5 marks] What are coupling and cohesion, and why are they important in software design? Suggest measurable properties of a software design that can be used as indicators of the amount of coupling and cohesion.

(b) [Risk Management – 5 marks] In order to assess which risks are the most important, it is common to calculate *risk exposure*, which gives a simple numeric value for each risk, allowing them to be compared. How would you calculate risk exposure for common software development project risks?

(c) [Software Aging – 5 marks] What are the *causes* and *symptoms* of software aging? What steps can be taken to reduce the problems associated with software aging?

(d) [Use Case Diagrams – 5 marks] Sketch a Use Case Diagram for a voting machine, on which voters can see a list of candidates and select one to vote for. The machine should check that each voter is eligible to vote. The electoral registrar will also want to print a summary of the total votes for each candidate, and (separately) a list of the voters who have voted, and a list of those who haven't. In case of a dispute, the machine should also list a complete record of who voted for whom, but only a judge can use this function.

2. **[Sequence Diagrams – 20 marks]** Sketch a Sequence Diagram for the process of registering a new voter who is not currently registered to vote in an upcoming election. Assume that a voter starts by checking the online electoral registration database, to see if she is listed. When she finds that she is not listed, she contacts the electoral registrar, who sends her an application form. As part of the application, she needs to contact the police, to request a copy of her police record, as persons with recent criminal convictions cannot vote. She then sends the police record along with the application form to the registrar. The registrar checks the form is filled out correctly, and then enters her details in the registration database. The registrar then sends an acknowledgement to the voter, who finally checks the online registration database again to confirm that her application was processed.

3. **[Class Diagrams – 20 marks]** Sketch a UML Class Diagram representing a domain model for a hockey league. A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey teams play games against each other. Each game has a score and a location. Teams are sometimes lead by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people, and people have names and addresses. Draw a class diagram for this information, and be sure to label all associations with appropriate multiplicities.

-
4. **[Project Management – 20 marks]** Describe three different tools that a manager can use to plan and/or track the progress of a project, and discuss the strengths and weaknesses of each. Explain the actions a manager could take if each of these tools indicates the project is not running according to plan.

[scratch paper]

[scratch paper]