

Name: \_\_\_\_\_

Student ID Number: \_\_\_\_\_

Signature: \_\_\_\_\_

## CPSC 444 2006-07 (T2) Final Exam

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### Exam Instructions (read carefully):

1. Sign the first page of the exam with your **signature** in the space provided on the upper left **immediately**.
2. Continue reading the instructions, but **do not open the exam booklet** until you are told to do so by a proctor.
3. Cheating is an academic offense. Your signature on the exam indicates that you **understand** and **agree to** the University's policies regarding cheating on exams.
4. The exam is **closed book**. There are **no aids permitted**, except for a **simple non-programmable calculator**.
5. There are 12 questions on this exam, each worth the indicated number of points. **Answer as many questions as you can**.
6. **Keep your answers short and to the point (i.e., avoid any unnecessary details)**.
7. Write **all** of your answers on these pages. If you need more space, there is blank space at the end of the exam. Be sure to indicate when a question is continued, **both** on the page for that question and on the continuation page. **Do not write on the back of any page**.
8. Interpret the exam questions as written. **No questions** will be answered by the proctor(s) during the exam period. **State your assumptions if you are unsure about a question**.
9. You have **2.5 hours** in which to work. **Budget your time wisely**.
10. No one will be permitted to enter the exam room after one half-hour from the start time, or to leave during the first half-hour of the exam. In addition, no one can leave the exam room during the **last ten minutes** of the exam.

Question	Points Possible	Mark
1	10	
2	4	
3	4	
4	6	
5	6	
6	12	
7	4	
8	3	
9	12	
10	12	
11	12	
12	15	
Total	100	

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### Question #1 [10 points total]: True/False

For each question, circle **one** of either true or false. You do **not** have to provide a justification for the answer you have given. [1 pt each]

- (a) When the system image closely matches the system model, conceptual mismatches are rare.  
True      False
- (b) Designing better error messages and feedback for the user helps to bridge the gulf of execution.  
True      False
- (c) Contextual inquiry is an evaluation methodology that involves interviewing users.  
True      False
- (d) The Apple Lisa was the first computer based on usability engineering that was a commercial success.  
True      False
- (e) The most effective way to reduce nervousness when giving a presentation is to memorize the presentation.  
True      False
- (f) In a Fitts' Law model, the index of performance can be calculated two different ways (through a direct division of mean scores and through linear regression), which both yield the same result.  
True      False
- (g) In an F-statistic, if for a given experiment the probability of achieving the resulting F-value came out to .079, you would be able to reject the null hypothesis assuming a confidence interval of 95%.  
True      False
- (h) With respect to McGrath's taxonomy of 8 different research strategies, McGrenere et al.'s study evaluating the prototype MSWord Personal would best be described as a "Field Study."  
True      False
- (i) According to Dmitry Nekrasovski, one of the biggest challenges of doing interaction design in industry is selling the value of this work to clients/others.  
True      False
- (j) Wendy Mackay's "Using Video to Support Interaction Design" showed that video was not particularly effective for brainstorming design ideas.  
True      False

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**Question #2 [4 points total]: Presentation Skills**

- (a) Based on what you learned in preparing for and in observing other student presentations (both in the design competition and the presentation tutorial), **identify four distinct non-content-specific things that influence the effectiveness of a presentation.** [4 pts]

1.

2.

3.

4.

**Question #3 [4 points total]: Empirical Laws**

- (a) Explain with reference to an empirical law discussed in class why it is faster to execute a command to warm an item in the microwave for *33 seconds*, than it is to execute a command for *30 seconds*, for the given microwave touch keypad shown below. Make sure to **name the law** and **describe the law in plain language.** [4 pts]

7	8	9
4	5	6
1	2	3
0	START	

Name the relevant empirical law: \_\_\_\_\_

Describe the law in plain language (you may provide the formula, but it is not necessary and this does not negate your need to describe the law in plain language):

Explain why it is faster to use 33 seconds than 30 seconds:

**Question #4 [6 points total]: User Abilities**

You are redesigning the project below, involving a large-screen display, to be installed at the downtown headquarters of a bank, for the general public to experience the “joy” of real-time stock trading.

48 popular stocks and their prices are displayed on a 4 x 3 meter screen in real-time. Customers stand 2-3 meters away and use a handheld device to buy and sell stocks.

A *section* of the prototype display is shown below. When a price goes up (above start-of-day price), it is displayed in green; when it goes down (below start-of-day price), it turns red. Everything is on a vivid blue background, and all colours have the same brightness.

Stock symbol	SIRI	MSFT	INTC	CSCO	Black text
Current price	6.90	39.81	23.01	19.80	Green text
Price change since trading opened today	dn 2.11	up 0.29	dn 0.47	up 0.07	Red text
	ORCL	SUNW	CMGI	AMAT	Blue background (whole display)
	13.21	5.30	2.34	17.27	
	up 0.15	dn 0.01	dn 0.34	dn 0.29	
	JDSU	SCON	BIOM	YHOO	
	3.08	1.17	2.54	37.05	
	up 0.006	up 0.16	dn 0.48	dn 0.03	

*Actual size is an 8x6 grid (4x3 m)*

Users must be able to recognize price changes and make trades quickly. It is particularly important to know when a price is up for the day, and it suddenly goes down below the start-of-day price, and vice versa. It is also helpful to know prices that are **way** up or down compared to their start-of-day price. Unfortunately, the current design does not adequately draw the user’s attention to the price changes.

- (a) When a price changes, the text label changes between “up” and “dn”. Drawing from your knowledge of **visual perception**, give **one reason** why this change doesn’t draw the user’s attention. [1 pts]
- (b) Price changes are also shown in different colours, and we learned that colour changes can be effective for drawing the user’s attention. However, this design suffers from several problems related to the **use of colour**. Identify **two** of them. [2 pts]

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**Question #4 (continued)**

- (c) Propose a better way of indicating price changes to the user, taking into account the trade-offs against obtrusiveness and annoyance to the user. Unfortunately, because the display is in a public area, sound notification isn't feasible. [3 pts]

**Question #5 [6 points total]: Design and Evaluation in Ubiquitous Computing**

- (a) Briefly describe **three** ways in which evaluating a mobile UbiComp application (such as the one you developed in your project) in a usability lab study is **more challenging** than evaluating a desktop application (such as a word processor or spreadsheet) in the lab. [3 pts]
  
  
  
  
  
  
  
  
  
  
- (b) Briefly describe **three** main challenges inherent in **designing and prototyping** an application for a smart phone as compared to a desktop application. [3 pts]

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**Question #6 [12 points total]: HCI Research – CSCW**

- (a) Identify the two primary dimensions of groupware and each of their subcomponents by filling out the following diagram. In each quadrant provide 1 example of a system that is appropriate to that quadrant. You may use generic system names (e.g., email) or specific system names (e.g., Microsoft Outlook). [5 pts]

Dimension 2: \_\_\_\_\_.

C: \_\_\_\_\_                      D: \_\_\_\_\_

Dimension 1: _____ B: _____	
A: _____	

- (b) Guest lecturer Kori Inkpen described a body of research that is focused on one of these quadrants. Which is it? [1 pt]

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### Question #6 (continued)

- (c) In "The Mechanics of Collaboration" Gutwin and Greenberg discuss several mechanics which affect collaboration. One of these is **coordination of action**.

Choose one of the technologies that your 444 team **used to support collaboration** during your group project (e.g. MSN Messenger, Google Documents, emailing Word documents back and forth, cell phone communication, etc.) and discuss how well it worked (or didn't work) for **coordination of action** in terms of **each of** the authors' three evaluation criteria (effectiveness, efficiency, satisfaction). [6 pts]

Collaboration technology used: \_\_\_\_\_

Coordination of action – effectiveness:

Coordination of action – efficiency:

Coordination of action – satisfaction:

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**Question #7 [4 points total]: HCI Research – Information Visualization**

- (a) According to guest lecturer Tamara Munzner, what is the current thinking in the information visualization community on the **usability of 2D versus 3D visualization techniques**? [2 pts]
- (b) Tamara Munzner described a **tradeoff between information density and getting lost**. What is that tradeoff? [2 pts]

**Question #8 [3 points total]: History of HCI**

Describe **Alan Kay's role** in designing what is known today as the **personal computer**. In addition, explain how **designing for children** factored into his **philosophy of design**. [3 pts]



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**Question #9 [12 points total]: Design & Evaluation Theory**

- (a) Which **type of validity** is best preserved and is least preserved for each of qualitative field studies and controlled experimental studies. **Justify** each of your answers in **one short sentence/phrase**. [6 pts]

Qualitative field studies:

Best preserved: \_\_\_\_\_

Least preserved: \_\_\_\_\_

Controlled experimental studies:

Best preserved: \_\_\_\_\_

Least preserved: \_\_\_\_\_

- (b) What is the fundamental message of McGrath's article on "Methodology Matters"? You need to refer to generalizability, precision, and realism in your answer. [4 pts]

- (c) What is the practical implication of this for HCI researchers? [2 pts]

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### Question #10 [12 points total]: Field Methods

Imagine that you are consulting for a company that is designing the "electronic classroom of the future." Before designing this new technology, you have recommended that they gain a comprehensive and clear understanding of how current e-classrooms operate – both in terms of infrastructure (whiteboards, furniture, electronic projection etc.) and human interaction (teachers and students). You have been hired to conduct an **initial exploratory field study** to gather information for your client.

1. Provide **two focal points** for your initial study, and briefly **justify each one**. [6 pts]
2. Provide **three questions** related to **each** focal point (8 questions in total). [6 pts]

focal point #1:

justification:

question 1:

question 2:

question 3:

focal point #2:

justification:

question 1:

question 2:

question 3:

**Question #11 [12 points total]: Statistical Analysis**

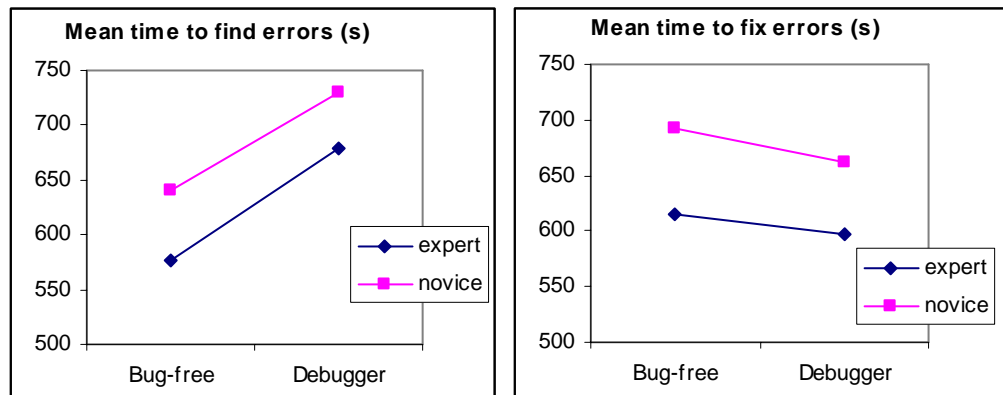
Buggy Inc. is a company that specializes in the development of visual debugging interfaces for large, complex software engineering projects. They recently developed a software package (called Bug-free) that uses an innovative scheme to highlight syntax errors in code. Because their package has the exact same functionality as a software package sold by one of their competitors (called Debugger), they **ran a controlled experiment to see which of the two software packages is more usable**. They hoped to show that their package is more usable than their competitor's for both novices and experts, but suspected it may only be the case for novices. The study compared how rapidly users can find syntactic errors in their code and how quickly their interface allows them to make corrections.

**2 Independent variables:** (1) software package (Bug-free, Debugger; within subjects); (2) user expertise (novice, expert; between subjects)

**2 Dependent variables:** (1) time to find errors; (2) time to fix errors

**Study design:** 10 novices and 10 experts each completed 5 tasks in each of the two software packages. (The order of seeing the software packages was fully counterbalanced.)

**Results:** These two graphs show the mean completion times (across all 5 tasks) for each dependent measure:



A 2-way ANOVA (software package X expertise) was run for each of the dependent measures:

ANOVA Time to find errors						
Source of Variation	SS	df	MS	F	P-value	F crit
Sample (expertise)	33524.1	1	33524.1	3.19403	0.08233	4.113165
Columns (package)	92929.6	1	92929.6	8.853928	0.005199	4.113165
Interaction	518.4	1	518.4	0.049391	0.825383	4.113165
Within	377851	36	10495.86			
Total	504823.1	39				

ANOVA Time to fix errors						
Source of Variation	SS	df	MS	F	P-value	F crit
Sample (expertise)	49773.03	1	49773.03	5.217752	0.028358	4.113165
Columns (package)	5880.625	1	5880.625	0.616471	0.437498	4.113165
Interaction	442.225	1	442.225	0.046359	0.83074	4.113165
Within	343410.1	36	9539.169			
Total	399506	39				

Provide you answer on following page.

**NO CREDIT GIVEN FOR ANYTHING WRITTEN ON THIS PAGE.**

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**Question #11 (continued)**

- (a) Your job is to explain and interpret these results. For each dependent measure state all the **effects tested** and which resulted in a **significant** finding. You must state your assumed **confidence level**. [6 pts]
- (b) Next, **interpret** these results by explaining what Buggy Inc. can conclude from this study, both about the software packages and about user expertise? [6 pts]

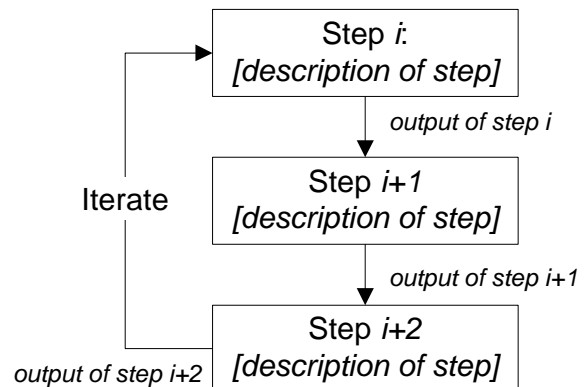
**Question #12 [15 points total]: Design Process**

Together with a few friends, you've come up with what you believe is a really neat and novel design idea, namely a public electronic message board. Current message boards (in places like the UBC sub and bus loop) are a mess, and you think it would be easier if people could post to them in person, perhaps using a cellphone or PDA as an input device, and/or remotely through a web interface. The goal is to design an easy to use large screen public message board.

You need to plan the **process** you will take, to get from the general design idea (just described) to a fully functional prototype approved by all critical stakeholders. Given that you have approximately 3 months for this task and a small team who are all trained in HCI techniques, you decide to take a user-centered design approach.

On the following page, diagram 6-10 steps of a possible design process that encompasses the following:

- Include the points at which you propose to include users, a justification for doing so, and how;
- Indicate with arrows where you are likely to iterate on stages in the design, as demonstrated in diagram at right.
- For each step, state the primary activity of that step (e.g. "prototype functional flow" or "evaluate appearance prototype"), AND describe the activity and its objectives in more detail (one sentence), AND state the output of that step.
- For prototyping and evaluation steps, the activity description should include the general type of prototype you would expect to build or the type of study you'd conduct, based on the information you expect to need at that point.



There is no single correct answer to this question, although there are some key steps that should not be omitted. Sequencing and to some degree which steps are included can vary (and does, in the real world), depending on constraints and the nature of the problem. Credit will be given for reasonable and well-justified answers; and for completeness of the overall process. [15 pts]

**Provide your answer on following page.**

**NO CREDIT GIVEN FOR ANYTHING WRITTEN ON THIS PAGE.**

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**Question #12 (continued)**

Diagram your design process on this page.

Name: \_\_\_\_\_ Student ID Number: \_\_\_\_\_

*Blank page for extra work*

Name: \_\_\_\_\_ Student ID Number: \_\_\_\_\_

*Blank page for extra work*