CS 160: User Interface Design  
Spring, 2015

Midterm Exam

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Your name (please print):

Your Student ID Number:

This is a closed book, individual test. You are not allowed to use your notes, texts, or any electronic devices including laptop computers, calculators or cell phones.

You have 75 minutes for this exam. There are a total of 123 points.

Use your time accordingly. You may not have time to get to every question.

Before you begin, write your initials on every page!  
You will lose 1 point if you do not do this.

If you find a question ambiguous, document the ambiguity. Indicate the way you interpreted the question in a set of separate sentences next to the question. The questions on the exam are not intended to be ambiguous, but sometimes another meaning is interpreted by the examinee that we did not take into consideration.
Q1: Short Answers (39 pts)

1.0 Did you write your initials on every sheet? (1 pt)

1.1 Draw a diagram of the iterative design process, labeling the three major stages. (4 pts)

1.2 For each of the three stages of the iterative design process, name two activities that a UX professional might engage in. (3 pts)

1.3 Name two ways in which the iterative design process differs from the Waterfall model. (2 pts)

1.4 What are personas and why do we use them in the design process? (2 pts)
1.5 Name two rules for providing an effective critique. (2 pts)

1.6 What model of participant-researcher interaction does Contextual Inquiry follow? What benefits does this model provide over alternate models? (3 pts)

1.7 What is the difference between a task and a scenario? (2 pts)

1.8 What are affordances and signifiers? (2 pts)
1.9 **Name and explain** the two gulfs between a physical system and a user’s goals. (4 pts)

1.10 When conducting a paper-prototype user test, you should ideally have four testers involved. Name **two** of the four roles that testers could take, and briefly describe them. (2 pts)

1.11 Name two disadvantages of user testing with high-fidelity prototypes. (2 pts)

1.12 Name one advantage and one disadvantage of a between-subjects experimental design. (2 pts)
1.13 What is a metaphor? Give two examples of good metaphors in a GUI-based operating system. (2 pts)

1.14 In your programming assignments, you used an asynchronous method to fetch a Flickr image from a web service. Why was it important to use an asynchronous call in this situation? (2 pts)

1.15 Fill in the blanks in the following bit of KinomaJS that is intended to listen to messages addressed to “/getPicture” and will fetch JSON data from a web service at http://ws.com. (4 pts)

```
_________.bind( ______________, { 
  onInvoke: function(self, message){

    self.invoke(new ____________(“http://ws.com”, Message.______));
  }
});
```
Q2: Design Process – (21 pts)

For this question, imagine that you are working on a project to improve the design of a public library's information technology. Specifically, you seek to make it easier for library patrons to find a specific book within the shelving system of the library.

2.1 How would you go about conducting a contextual inquiry to inform your design process? (3 pts)

2.2 Create a persona that would be useful in the design process for this project (5 pts)

2.3 Imagine that you want to support the task outlined above using a mobile app on the library patron’s smart phone. Describe a scenario of usage for that mobile app. (3 pts)
2.4 Design a quick UI for this mobile app and incorporate it into a storyboard that illustrates the scenario you described above. (10 pts)
Q3: Modality & Heuristic Evaluation (21 pts)

3.1 Define “modality” and give an example of a mode. (2 pts)

3.2 How are modes useful? Why are they sometimes problematic, and how can these problems be fixed? (3 pts)

3.3 What are quasi-modes (name an example)? Why are quasi-modes beneficial? (2 pts)
3.4 Describe how the following interface relates to modality. Is it effective? Why or why not? (2 pts)

3.5 Name two benefits and two drawbacks of Heuristic Evaluation. (4 pts)
3.6 Ideally, how many evaluators should be used in a Heuristic Evaluation? Why? (2 pts)

Nielsen’s heuristics are as follows:
H1 Visibility of system status
H2 Match between system and the real world
H3 User control & freedom
H4 Consistency & standards
H5 Error prevention
H6 Recognition rather than recall
H7 Flexibility & efficiency of use
H8 Aesthetic & minimalist design
H9 Help users recognize, diagnose, and recover from errors
H10 Help & Documentation

3.7 What is the best choice for which heuristic the following UI violates? Why? (2 pts)
3.8 Which heuristic does the following UI best exemplify? Why? (2 pts)

![Image of UI with menu options]

3.9 Which heuristic does the following UI best exemplify? Why? (2 pts)

![Image of LinkedIn customization page]

Welcome Svend, let's customize your LinkedIn experience

Here are some things we think you'll enjoy.

LinkedIn Influencers share their advice and big ideas.

Ban Ki-moon
Secretary General of the United Nations

Richard Branson
Founder at Virgin Group

Bill Gates
Co-chair, Bill & Melinda Gates Foundation

Judy Smith
Founder and President, Smith & Company and...
Q4: Human Information Processing & Input (21 pts)

4.1 Name the six major components of the Model Human Processor as numbered by the following diagram. (6 pts)

4.2 Reasoning with the Model Human Processor, why are telephone numbers 7 digits long? (1 pt)

4.3 The Power Law of Practice does not apply to all practiced skills. Name two situations in which it does not apply. (2 pts)
4.4 You designed the next Yo app (application for very fast, one word communication). You wanted it to have more features, so you included 4 buttons: [Hi], [Hey], [Sup], [Wat]. After some user testing, you decide that [Hi] and [Hey] are too similar, so you decide to remove the [Hey] button. Your app now contains 3 buttons [Hi], [Sup], [Wat].

How many times faster can your users now make a choice in which button to press? (2 pts)

Given these times, complete the following two questions.
Perceptual Processor: 100ms, Cognitive Processor: 70ms, Motor Processor: 70ms, Visual Store access: 200ms, Audio Store access: 1500ms

4.5 You are playing Pokemon and you really want to catch Mewtwo with a normal Pokeball. You read online that if you mash the “A” button on your Gameboy, it’ll increase the probability that you can catch Mewtwo.

About how many times can you press the button in 10 seconds? (2 pts)

4.6 Hmm, that didn’t seem to work. You keep searching around online, and you find an article that says there’s an even better approach. During the catch sequence, Mewtwo will randomly make a sound. If you press “B” immediately after that sound, it will increase your odds.

How fast can you press the button in response to the sound? (2 pts)
4.7 What is Fitts’ Law? Does it apply to mobile devices? (2 pts)

4.8 What is the index of difficulty in Fitts’ Law? What does it describe and what are the terms? (2 pts)

4.9 List two input challenges associated with touch-based interfaces. (2 pts)
Q5. Evaluating User Interfaces (21 points)

5.1 The Belmont Report identifies three fundamental ethical principles for including human subjects in research. **Name them.** (3 pts)

5.2 List **two specific things** you can do when running an experiment using human subjects to conduct your experiment ethically. (2 pts)

5.3 You are working on research with a colleague at Berkeley. The two of you disagree about whether an experiment you want to run is ethical. **How should you decide** who is right? (2 pts)
You have designed a brand new interface for sharing cool photos you find on Facebook. Instead of clicking the “Share” button, you merely have to think “I want to share this photo” and the photo is automatically shared. The following questions relate to this invention.

5.4 You want to prove to your co-workers how fast this new method is, so you design an experiment. State a testable hypothesis for your experiment. (1 pt)

5.5 You stand outside of CS160 after class one day to recruit participants for your study. You offer students $1000 each to come participate in your 30-minute long user interface study. Name two potential problems with your recruiting strategy. (2 pts)
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5.6 Your research on brain user interfaces suggests that using Snapchat causes dramatic changes in brain function. Conveniently, after recruiting subjects, you have 20 current Snapchat users and 20 users who have never used Snapchat. Describe a between-subjects experimental design for testing your hypothesis from Question 5.4.

Include everything we would need to know to replicate your experiment. (7 pts)
5.7 In your experimental design, what are the **independent**, **dependent**, **random**, and **controlled** variables? (4 pts)

**Independent:**

**Dependent:**

**Random:**

**Controlled:**

**Q6 Extra Credit!**

6.1 Who were the “average users” testing the copy machine in the Xerox PARC video? (1 pt)

6.2 What is the relationship between within-subjects design and the Power Law of Practice? (1 pt)

6.3 What topic in this course does Andy get most passionately angry about? (1 pt)