

# Sample Midterm

*[This sample exam is representative of the actual midterm, but the type, form, topics, and number of problems on the actual midterm may not be the same.]*

Please read all the problems carefully. Do everything we ask for, neither more nor less. If you have any questions on what a problem means, don't hesitate to ask. Don't get bogged down on any one problem; there are 54 points possible, so allowing approximately one minute per point will give you some time left over. If you have trouble on a problem, go on to the next one. When you're done, you may turn in your exam and leave.

In answering these questions, you may use any paper materials that you brought with you. You may not share any materials with classmates during the exam and you may not use any electronic devices.

Use the correct HCI terminology wherever possible in your answers and describe how those terms and principles apply to the specific facts stated in the problem.

Please write your answers clearly and neatly—we can't give you credit if we can't decipher what you've written. Use the backs of the pages (or any other paper) for scratch work, but cross out any work that you don't want us to consider as part of your answer (and if your answer doesn't appear entirely within the indicated answer space for a question, indicate clearly where the rest of the answer is). We'll give partial credit for partially correct answers, so writing something is better than writing nothing. But we will also deduct for irrelevant, extraneous information, even if the correct answer is buried somewhere within it, so don't just write down everything you know. We have given length guidelines for many answers; ignore them at your own risk (but aim for clarity and conciseness more than a specific number of sentences in your answer). Unless your handwriting is huge, the space we provide for an answer should be more than enough. It is generally best to think more and write less.

Good luck!

## Problem 1 (3 points)

Many applications use keyboard shortcuts (like control-S or command-S to save a file, or like using the tab key to move from one field of a form to the next).

(a) Keyboard shortcuts are an example of one of Jakob Nielsen's usability principles. Which one?

(b) There's also one of Nielsen's principles that keyboard shortcuts *don't* follow. Which principle would favor menu items, for example, over keyboard shortcuts?

(c) A music-creation web site that allows the user to specify notes by clicking on an image of a piano keyboard illustrates which of Nielsen's principles?

**Problem 1**  
(3 points)

**Problem 2**  
(8 points)

**Problem 3**  
(3 points)

**Problem 4**  
(10 points)

**Problem 5**  
(3 points)

**Problem 6**  
(6 points)

**Problem 7**  
(4 points)

**Problem 8**  
(5 points)

**Problem 9**  
(12 points)

**Total**  
(54 points)

**Problem 2** (8 points)

These require only very brief answers.

- (a) Why can't we expect to get good interaction designs by just relying on the HCI designer or developer's expertise and common sense?
- (b) Why can't we use a "theory of HCI" that lets us look at an interface and tell how usable it will be (the way we can look at code through the "theory of algorithms" and tell how long it will take to run)?
- (c) So what is the primary technique/practice/principle we use to achieve good interfaces?
- (d) What is the drawback/disadvantage of the approach in part (c)? In other words, why isn't it effective enough to give us usable interfaces every time?

**Problem 3** (3 points)

Alex and Sam are designing a web site for architects. Part of the site will give detailed building design plans (blueprints). Sam wants the blueprint page to use different shades of blue, but Alex wants to use black and white, with red where additional color is needed. Who has the better design, and why?

**Problem 4** (10 points)

- (a) (3 points) For each of the user tasks below, indicate whether it's an example of long-term memory, short-term memory, or pre-attentive processing.
  - (a.1) The status panel in a fantasy game flashes yellow when a monster is nearby.
  - (a.2) An instructor tells the class a special Email address for course-related questions
  - (a.3) An on-line course registration system displays a five-digit course number; to enroll, the user has to type that number on the next screen
  - (a.4) A traveler buys one-day wi-fi access at the airport and receives a login ID and password. Every 15 minutes or so, the system disconnects the traveler, who then has to log in again
  - (a.5) An industrial robot's status display's background turns red when the robot is low on oil
  - (a.6) An on-line restaurant menu lists appetizers, main dishes, drinks, and desserts, each in a separate column

(b) (2 points) Pick any two of the memory-related (non-pre-attentive) items above and, for each, describe a change to the system that would reduce or eliminate the memory burden.

(c) (3 points) We can use a variety of coding methods to represent different items visually.

(c.1) Which method—different colors or different three-letter strings—allows the user to distinguish a greater number of different items?

(c.2) What is a possible disadvantage of using three-letter strings?

(c.3) What is a possible disadvantage of using colors?

(d) (2 points)

Which of the following is justified by George Miller's rule of  $7 \pm 2$ ? Circle the one best answer.

- A. Don't design PowerPoint slides with more than 9 bullet points; instead, split the points over multiple slides.
- B. Don't have fewer than 5 items in a menu.
- C. Don't expect a user to remember a random 10-digit password from one screen to the next.
- D. Don't design web pages with dozens of links.
- E. Don't require users to memorize 10-digit telephone numbers.

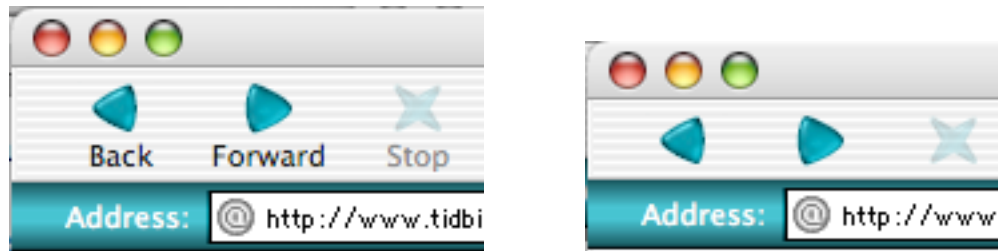
**Problem 5** (3 points)

Some of the following are reasons why natural language understanding is still a difficult problem for computer systems. Some are not. Check each item that *does* help explain why natural language understanding is hard.

- ☐ Natural language is ambiguous, and a lot of real-world context is required to disambiguate sentences.
- ☐ Continuous speech is not easily divisible into discrete individual sounds or words.
- ☐ Natural language is rich in its ability to paraphrase—there are many possible variations for expressing the same meaning.
- ☐ Most modern programming languages have poorly developed facilities for string handling.
- ☐ Individual speakers' voices vary greatly due to age, gender, native language, and regional dialect.
- ☐ Past attempts at natural language understanding have been so unsuccessful that hardly any researchers work on the problem these days.

**Problem 6** (6 points) *[This question inspired by Bruce Tognazzini]*

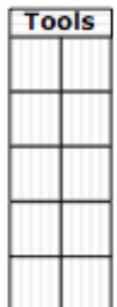
(a) (2 points) These two screen shots show a web browser's toolbar with a preference set in two different ways:



Which setting—with or without the text labels—provides faster access to the back/forward/stop tools? Give one sentence justifying your answer.

(b) (2 points) Which provides faster access, one menu bar at the top of the screen or a menu bar at the top of each window? Give one sentence justifying your answer.

(c) (2 points) If you have a toolbar at the right edge of your screen (like the one shown here), containing ten 16x16-pixel icons in two columns of five, how could you rearrange these icons for faster average access? Again, explain your answer.

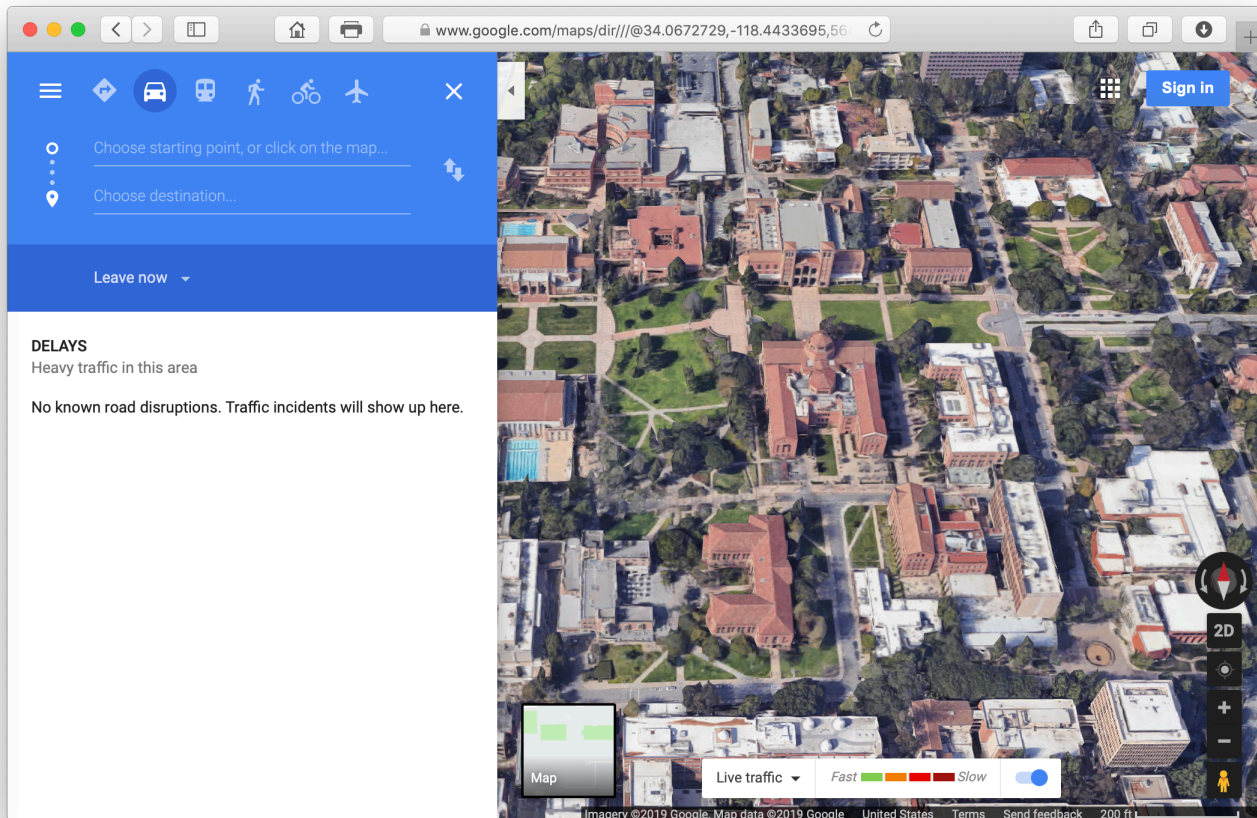
**Problem 7** (4 points)

(a) (2 points) You want to evaluate alternative web page designs. The issues you want to focus on are choice of typeface, color, and overall readability of the site. Would you use a high-fidelity prototype or a low-fidelity prototype, and why?

(b) (2 points) You want to evaluate alternative web page designs. The issues you want to focus on are the organization of the site and the overall ease of navigation. Would you use a high-fidelity prototype or a low-fidelity prototype, and why?

**Problem 8** (5 points)

Below is a screen shot from Google Earth.



(a) (3 points) Identify three of the best, clearest affordances on this image for users of this application (don't choose two instances of the same kind of control). For each, say what action or function it affords.

(b) (2 points) Identify one control on this page that could be a clearer example of an affordance, and say what could be clearer about it. (This doesn't have to be something that's terribly confusing; it just has to be capable of improvement as an affordance.)

(c) (0 points, just for fun) Draw an X on the map above to indicate where you are right now.

**Problem 9** (12 points)

Different applications have different HCI requirements. Fill in the empty cells of the table below with brief descriptions of the various requirements for each listed task in each category. The cells are small, so you can't be complete; just list the characteristics that most distinguish each task.

| <b>Task:</b><br><b>Category:</b>                                | <b>Web-based store</b>                                                               | <b>Fighter jet</b>                                                                         | <b>Automatic flight<br/>check-in kiosk at<br/>airport</b>                                     | <b>Smart glasses for<br/>people with de-<br/>mentia</b>                                   |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Functional</b>                                               | Display merchandise, accept orders, interact with the rest of the order system       | Respond to pilot's commands, fly safely and effectively, fire weapons and evade enemy fire | User enters ticket number, baggage info; kiosk may allow choosing seats; prints boarding pass | Recognize faces of nearby people; give directions to help user get around; detect hazards |
| <b>Data</b>                                                     | Merchandise in stock, customers' orders, possibly customer info and preferences      |                                                                                            |                                                                                               |                                                                                           |
| <b>Environmental<br/>(physical, social,<br/>organizational)</b> | Most anywhere, any type device. Usually used solo; no formal training, documentation |                                                                                            |                                                                                               |                                                                                           |
| <b>User</b>                                                     | General public, teens/adults; familiar with web browsing but not nec. other tech.    |                                                                                            |                                                                                               |                                                                                           |
| <b>Usability</b>                                                | Commerce requires trust, clear feedback, low frustration/high satisfaction           |                                                                                            |                                                                                               |                                                                                           |