Your name (please print): ____________________________________________________

This is a closed book, individual test.

You are not allowed to use your notes, texts, or any electronic devices including laptop computers, calculators, mobile phones, smartwatches, Google glass, smart clothing, or electronic tattoos.

You have 80 minutes for this exam.

There are a total of 43 questions with 121 points and one extra credit question worth 2 points. The last series of questions is worth a significant amount of the exam and requires significantly more effort and time. Please allow time to complete that section. The exam is 18 pages front and back.

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

Please write neatly. We cannot give credit for what we cannot read

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.

Good Luck!
1. Write your name on every sheet of this exam. No answer is required in the space below this question, but you must write your name on all pages front and back to receive full credit. (1 point)

2. What is a skeuomorphism? List at least one way it can be beneficial and one way it can be detrimental to a design. (3 points)

3. What is Context Aware Computing? (2 points)

4. Describe an example of Context Aware Computing? (2 points)

5. Where should a Contextual Inquiry take place and why? (2 points)
6. What is a persona and how is it used in the design process? (3 points)

7. List three ways that information can be acquired for defining a persona. (3 points)

8. You arrive home from a holiday on a cold winter’s night to a freezing house. You need to get the house warm as quickly as possible using the central heating system. You decide that the to set the thermostat as high as possible to most rapidly warm the house. What internal cognitive framework is driving this decision? (1 point)

9. People are likely to become more efficient at using an interface over repeated use. What HCI term describes this? (1 point)
10. The image below shows a new interface design for an electronic reading device on a flexible display. To turn a single page a user performs the action shown here (i.e. see right hand in image). This is an example of why type of user interface? List one advantage and one disadvantage of this interaction design. (3 points)

![Interface Design Image]

11. What does the acronym GUI stand for? (1 point)

12. What is a mode? Why are quasimodes preferable to modes? (2 points)
13. Draw a diagram of the three stage design cycle. Label each of the stages. (3 points)

14. List at least one typical activity you would perform during each labeled stage in the above diagram. (3 points)
15. Your client has just asked your design team to conduct a user study of a major interface design feature of their service. It is important that the test adequately measure the quality of the new interface with very little contamination by extraneous factors. Do you use a between subjects or within subjects design? List one advantage and one disadvantage of the design you’ve chosen. (3 points)

16. Name three guidelines that make for an effective critique. (3 points)

17. Describe two ways to establish visual hierarchy with typography. (2 points)

18. Consider that you have a brand new Internet of Things idea you want to develop. In order to determine user needs, you decide to perform a contextual inquiry. What is the most suitable relationship that you should have with your user during your contextual inquiry? (1 points)
19. You have conducted a user study to evaluate two different interface designs (A and B).
Your study procedure for each subject is shown below. Is this a within subjects or between subjects study? Are there any potential confounds? If so describe. (4 points)

![Study Procedure Diagram]

20. Which of Don Norman’s design principles do the stove top controls below most clearly violate? Choose one. (1 points)

a) Visibility  b) Mapping  c) Feedback  d) All of them.

![Stove Top Controls Image]
21. List three attributes of “Working Memory” in the Model Human Processor. (3 points)

22. List two visual pre-attentive features. What is an advantage of using designs that incorporate such pre-attentive visual elements? (3 points)

23. In Android programming what is the difference between a **LinearLayout** and **RelativeLayout**? Sketch a simple layout where a LinearLayout would be easier to implement programmatically, and similarly one for RelativeLayout. (4 points)
24. The Apple Watch incorporates a digital crown into its design. What HCI design principle is responsible for this design and why? (3 points)

25. Why would a designer, aware of Fitts’ Law, use it inform a design that goes against improving target selection for a user? What two design elements would they likely use to make such a selection more difficult? (3 points)

26. Apple recent 3D touch (i.e force touch) is a pressure sensitive multi-touch technology that enables trackpads and touch screens to distinguish between different levels of force being applied to their surfaces. 3D touch is an example of what HCI technique? In the example shown to the right what other HCI technique is being used? (2 points)
27. What is the role of an Institutional Review Board in HCI? (2 points)

28. Below are two examples of scroll bars. The two designs take different approaches to the placement of the up and down buttons on the scroll bar. What HCI principle is guiding each of the below design choices for the up and down button placement? Consider only the up and down buttons not the sliding scroll bar. (2 points)

Design A       Design B

29. Briefly describe the Wizard of Oz prototyping technique. List a key advantage and disadvantage? (3 points)
30. What HCI term best describes the type of prototype in the images below? (1 point)

![Prototype Images]

31. When you talk to Siri, the voice assistant that is part of Apple’s iOS, it renders an animation of the sound levels as shown below. What HCI Heuristic is being used? (2 points)

![Siri Animation]

32. What are two different menu types that take advantage of Fitts’ Law? (2 points)
33. In Apple’s iOS a user can type part of what they are looking for with suggestions dynamically appearing below. This is an example a user is trying to locate the Calendar App. Which HCI Heuristic being used well? (2 points)

34. Later a user is using the same iOS device from question 32 to locate the Calendar App using the main app view. Which HCI Heuristic is being violated here with respect to what is also shown in question 32. (2 points)
35. What are the two gulfs in user interaction? Describe the problem that each gulf is addressing. (4 points)

36. List two advantages and one disadvantage of Heuristic Evaluation compared to User Testing. (3 points)

37. In the below image what type of graph technique is being used to communicate the results? (1 point)
**Design Exercise for AquaGo**

**Consider the following scenario:**

Doctors recommend the average adult drink eight 8-oz glasses of water (about half a gallon) a day. As a designer for AquaGo, you want to create a mobile app (no smartwatch) which helps users stay hydrated and find nearby public water sources.

A young working professional has taken time off to go to Outside Lands, a popular music festival during the summer in San Francisco. While walking around between music sets, they suddenly start to feel faint. They get a notification on their phone from a reminder they set earlier to drink a glass of water. Because they don’t want to pay $4 for a plastic bottle of water, they open AquaGo to its “Map” feature which has labeled free public drinking fountains. By clicking on a fountain on the map, they get a detailed view which includes information like how clean the fountain is, how the water tastes, and how high the water shoots from the fountain head. After swiping through some fountains, the user finds one they’re satisfied with, and walks towards it to stay hydrated.

38. Develop a persona for this young working professional and describe the persona below. (3 points)
39. Using your persona, draw a storyboard for this app. Clearly label the problem, solution and benefit steps of your storyboard. (6 points)
40. Design the UI for this mobile app. Sketch the screens involved to start the app, set a notification schedule for hydration reminders, look at the map of nearby fountains, and see detailed information of a fountain. Label which gestures and touch events users execute to navigate between screens. Be sure to incorporate visual and interaction design in your sketch. (Although simplicity is a virtue, include at least 4 screens for these major steps.) (10 points)
You realized that a large portion of your target user group is starting to use Android Wear smartwatches, and you decide to extend your application by building an Android Wear companion application. The good news is that the newest version of Android Wear has a new sensor: the Hydrometer, which detects the hydration levels of the person wearing it (in 4 levels: Good, Fair, Dehydrated, and Severely Dehydrated). When the user first opens the smartwatch, they are presented with their current hydration level. When the user’s hydration level falls to Dehydrated, the watch automatically sends a bridged notification. When the user is near a water fountain, the watch sends a contextual notification.

41. Design the UI for the smartwatch component only of this app. Sketch the screens involved to start the app, and both kinds of notifications. Label which gestures and touch events users execute to navigate between screens. Be sure to incorporate visual and interaction design in your sketch. (8 points)
42. As an Android Wear developer, when should you implement a contextual notification vs. a bridged notification? Which type of notification is easier to implement? Why? (4 points)

43. Describe at least two elements (screen, layout, interaction flow, graphics) in your mobile UI that would change with the new smartwatch integration. For each of these elements, describe why the element was changed to enable a more effective design. (4 points)

Extra credit (2 points): What was the name of the Turing Award winning computer scientist, pioneering in artificial intelligence, designer of the first visual scanners and mechanical hands with tactile sensors, as well as a consultant for the futuristic technology included in Stanley Kubrick’s 2001: A Space Odyssey that passed away at the start of our semester at the age of 88?