Name (print): _____________________________________________

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  - Do your best to prevent anyone else from seeing your work.
  - Do NOT communicate with anyone other than the professor/proctor for ANY reason in ANY language in ANY manner.
  - Do not use notes, books, calculators, etc during the exam.
  - Turn all mobile devices off and put them away now. You cannot have them on your desk.
  - Write neatly and clearly. What I cannot read, I will assume to be incorrect.
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1. (1 point) Who invented the first mouse?

**Solution:** Douglas Englebart

2. (1 point) What is meant by the term “user centered design”?

**Solution:** Focuses on user and builds design from user needs/wants/requirements

3. (2 points) What are *styleguides* and why are they important in HCI?

**Solution:** They codify many design principles for different platforms that are popular with developers. By codifying some basic principles, it ensures that developers include basic usability in their apps. Helps maintain consistency and generalizability of system.

4. (2 points) What does the acronym WIMP stand for? What is an example of a pre-1984 system that would be described by this acronym?

**Solution:** Windows, Icons, Menus, Pointers
Apple Lisa, Xerox Alto, Xerox Star, Apple II

5. (2 points) Provide an example of when an auditory interface (input and output) would be more appropriate then a visual and keyboard interface.

**Solution:** For blind/visually impaired users
Anywhere where hands need to be occupied with other tasks (e.g. driving)
Situations which require a user to be moving/mobile.

6. (2 points) What is the difference between *formative* and *summative* evaluation?

**Solution:** Formative: done at beginning and during design
Summative: done on finished (or mostly implemented) project

7. (2 points) Draw one cycle in the iterative design process.
Solution:

Plan -> Prototype/Build -> Evaluate -> Analyze/Refine --

Design-->Implement->Use/Evaluate

8. (2 points) What are the “tabs,” “pads,” and “boards” of Mark Weiser’s vision of ubiquitous computing in the 21st century?

Solution: tabs: inch scale ”post it notes”
             pads: foot scale sheet of paper size
             boards: yard scale (bulletin or black board size)

9. (3 points) What was the name of the futuristic device proposed by Vannevar Bush in 1945? List two key aspects of that system that were revolutionary at that time.

Solution: Memex
           nonlinear access to data
           all documents interconnected/linked

10. (3 points) You are designing a research submarine for underwater science and exploration. You are only told that your users will all have PhDs in marine biology, but are told little else about them. What are 3 implications of this fact for your design?

Solution: Will probably want some method of specimen collection from outside
          All will be literate and able to read signs/controls
          Will want to record many different types of data (pressure, temp, depth, etc) while using vehicle.
          Users will probably have high motivation to learn system to do their jobs
          Users will have extensive knowledge of marine biology so we can leverage terminology/metaphors from this field as appropriate
Sample good answer: “The user will be unfamiliar with guiding the sub so user drive controls should be simple and familiar if possible. The primary use of the sub is research so those aspects of the interface that deal with gathering data should be a priority. The user is probably not a computer expert so a Direct Manipulation style or something close to one would be desirable.”

Many design implications focused on task/system, instead of user characteristics (e.g. “ensure safety of user” You would design this regardless of whether or not your user had a PhD.). Also, many people listed some user characteristics without stating the implications those characteristics would have for the design.
11. You have a new job at McDonald’s, and your first assignment is to design a kiosk that will allow customers to place their orders. Your supervisor asks you how you will go about doing requirements definition and gathering for this task, and asks you to describe the two methods you are most likely to use and to explain why you think those methods are best.

(a) (2 points) List all the methods you can think of, from which you will choose two.

**Solution:** interviews, questionnaires, focus groups, ethnographic observation, cooperative eval, think-out-loud, documentation analysis, competitive products analysis. (Had to list at least 4 for full credit.)

(b) (0 points) Which two will you choose?

(c) (3 points) Explain/justify/defend your first selection in b above.

(d) (3 points) Explain/justify/defend your second selection in b above.

**Solution:** Sample good answers:

“Observation would be important for the design of an ordering kiosk because it would give a basis for the ordering interaction between the human cashier and customer. From those observations you can then be able to apply what you saw to make a similar interaction or attempt to improve upon what is lacking in the original. This is mainly to get basic functionality criteria.”

“As more systems become automated, it makes sense to analyze existing products. Competitive products would include other interfaces for requesting orders, such as a flight kiosk or an ATM. This approach is important because it’s valuable to establish consistency across what interfaces customers already use.”

“A questionnaire is appropriate in this case because we want to get a large data set so the results are useful. It would be easy to implement by giving it to customers with their meals and having a receptacle for the questionnaires near the garbage cans. This would allow the people that would actually use the system to give their opinions.”

“Observing how customers order, when and how they fail, and how they successfully place the order is important when trying to categorize and prioritize what options to present to the user.”

“How customers think, the flow of considerations they make is key in this design and it cannot be shows with any of the other methods. By doing thinking-out-loud, we can obtain the sequence of customers’ thinking and how they categorize their options, what they would like to specify and when, etc.”
12. (5 points) One of the most wide-spread interface metaphors on the internet is that of the “shopping cart.” This metaphor is used on most if not all e-commerce sites and has become a recognizable feature for anyone who has shopped online. Extending the shopping cart metaphor further is the notion of “check out,” as at a brick and mortar retail store.

The online shopping cart metaphor relates to a real-world shopping cart in that you (the shopper) can put an item into it that you intend to buy, and then continue shopping. You are able to put multiple items into the shopping cart and purchase them all at once. The “check out” metaphor is related to the real-world action of wheeling your shopping cart to the checkout stand and completing the purchasing process.

Metaphors help users in their use of a UI, but can also be problematical if the correspondence between the real world and the computer metaphor is not always directly analogous to the real world (as in dragging a floppy disk to the trash can to eject, rather than to erase/delete it). In what ways does the shopping cart metaphor break down, in the sense of not being directly analogous to the real world?

**Solution:** Needed to list at least 2 breakdowns for full credit

- Can’t just glance into online shopping cart and see what you have in it. Have to click “View my cart”, click through pages, etc.
- Socially inappropriate to just abandon your shopping card in brick-and-mortar store and walk away
- Can often “save” shopping carts online
- In real life, not all stores have shopping carts.
- In real life, can’t remove an item any time you want. Have to walk around and put item back.
- Finite capacity of real shopping carts
- Can abandon check-out process online, but socially inappropriate to let cashier scan items and then walk-out in real life.
- In real life can give item you don’t want to purchase to cashier, but online all items checked out at once instantaneously.
- Quantity of items is represented differently
13. A company has just designed a user interface that was an utter disaster. You have been brought in as an HCI consultant to explain what they did wrong. For each of the below quotes from the company’s engineers, respond and explain what they should have done. What design principle(s) did they violate? Be specific. You may discuss either the 8 Golden Rules of Design in your book or the many sub-principles we discussed in class.

(a) (2 points) “We used it ourselves for over a week! We really loved it! I can’t understand why we’re getting all these nasty letters from our users!”

**Solution:** Users aren’t designers
cater to universal usability

(b) (2 points) “We wanted to save on screen real estate so we used 9 point text throughout the user interface. Well, now it turns out that all these Senior Citizens homes bought our software. They seem to be having trouble reading the text”.

**Solution:** cater to universal usability
violates substitutivity
violates customizability if user can’t change size

(c) (2 points) “All of us felt that OK and Cancel buttons in the lower right hand corner were boring. So instead, if you click at the top of the dialog box, it closes as if you did “OK,” and if you click at the bottom, it closes as if you clicked “Cancel.” Labels just take up screen real estate.”

**Solution:** violates consistency
violates generalizability

(d) (2 points) “The users seem to be getting stuck on one screen even though the information they need to answer questions was two screens back. Can’t they just remember things?”

**Solution:** increases rather than reduces short term memory load
violates observability
14. (a) (2 points) Explain what is meant by the “gulf of execution” and the “gulf of evaluation.”

**Solution:** Execution: Distance between user’s goals and means of achieving them in system. E.g. Does the system allow the user to do what they want? Evaluation: Amount of effort person must expend to interpret system state and judge if intention was achieved. E.g. Can user perceive if progressing favorably?

(b) (2 points) How can the idea of Direct Manipulation help designers bridge these two gulfs?

**Solution:** DM is based on 1) visibility of actions/objects of interest 2) rapid, reversible, incremental actions and 3) pointing at objects of interest. Under DM, the user should be able to understand visually what they need to do to accomplish their goal, thus reducing the Gulf of Execution. After an action, the system should display visual feedback after each action, thus reducing the Gulf of Evaluation.

15. Write a Likert scale question, and provide labels for a 5-point response scale, intended to elicit the responder’s attitude toward the use of location aware cell phones that would allow the phone owner to receive SMS notification of sales at any store that the phone is near.

(a) (2 points) Write the question here:

**Solution:**

(b) (2 points) Label the five possible responses here:

1 2 3 4 5

**Solution:** Problems: prejudicial language, scales not matching question

(c) (1 point) Why should Likert scale questions have an odd number of responses?

**Solution:** odd numbers allow for a neutral, no-opinion, or ambivalent answer.