Section A: HCI Process and Theory
Answer 2 of the following 4 questions

Q1. (a) Your task is to explain how a number of HCI models/theories relate (or do not relate) one to another: Distributed Cognition, Situated Action, and Activity Theory. Assume that the person for whom you are writing this is quite familiar with each of the models - you do not need to do any explaining of them.
(b) Next, imagine that you are developing a new mobile phone camera that automatically shares photos between social circles as each picture is taken. Describe what kind of features in the photo sharing camera would support each of the three models/theories.

Q2. Drawing on your readings of papers in the Design Methods section of the HCI Reading List, (a) identify three different design methodologies/approaches write a 50 word or less summary (elevator speech) describing what each is about, and
(b) then write about commonalities/similarities as well as contrasts/differences between the three. Assume the reader knows each method very well, so focus only on the similarities and differences. When there are similarities, be specific and explicit in describing them, likewise be specific in drawing contrasts.

(c) Now assume that you've been tasked with creating a wellness application. This application lets you enter healthy eating goals on your cell phone, track your progress, and allows your friends to see how you're doing (and you can see how they're doing). For each of the three design methods you've chosen, explain what aspects of it would/would not be appropriate for the design process of this application. In other words, explain how the features of this application align against the strengths and weaknesses of the three methods.

Q3. Question: The impact of technology on traditional HCI evaluation techniques **(has parts a-d)**

(a) Consider the classic HCI evaluation technique of the questionnaire. You may consider either questionnaires that are intended to be completed by an individual with no other human assistance or a questionnaire in which a human evaluator is present to assist in collecting information. Over the years, researchers and practitioners have introduced technological advances over the paper-and-pen form of a questionnaire or survey. Briefly describe two specific ways that technology has altered the way a paper-and-pen survey is administered. As a bonus (but not required) cite any examples of research papers using either or both of these technologically-modified survey techniques.

(b) For each of the two technological changes described in the first part of your answer, discuss what specific goal the change had to improve upon the quality or quantity of data collected by the traditional pen-and-paper technique. Also discuss what change in practice of the development (by designers) or completion (by end users) is required by the

technology enhancements, commenting on whether these are good or bad changes in practice.

(c) Suggest a use of a modern mobile device (e.g., smart phone or tablet) and/or modern interaction technique (e.g., multitouch, gesture, sensor-based) to support evaluation through surveying. Describe how your new use would take advantage of the technology or interaction technique. You do not have to discuss the details of any implementation, but be sure to suggest a plausible use that could happen with the state of technology today. Do not worry too much if you are uncertain of the novelty of your innovation, but be sure to make it different from the changes you described above.

(d) You are going to write a CHI 2013 paper on your innovation. State a specific hypothesis that is the basis for why you feel your innovation is an improvement over existing HCI evaluation techniques. Outline how you would design a research study to prove (or disprove) your hypothesis.

Q4. Question: The pros and cons of models (**has parts a-f)**

HCI researchers and designers often use models to help them create or evaluate solutions in a given problem domain. Two older models are the GOMS family of cognitive performance models and Fitts' Law.

(a) Briefly describe Fitts' Law. Provide one example of the use of Fitts' Law that supports the design or understanding of some interaction problem.

(b) Give a specific limitation of Fitts' Law? Provide an example of a situation in which the use of Fitts' Law would not apply.

(c) Briefly describe the origins and motivation behind the development and use of the GOMS family of cognitive models. Provide an example of the use of any GOMS modeling technique that demonstrates its effective use.

(d) Give a specific limitation of the GOMS family of modeling techniques. Provide an example of a design situation in which GOMS would not be an appropriate framework for solving the design problem.

(e) Fitts' Law and GOMS models were both developed prior to the 1990's. Pick any other modeling theory or framework (we will just call this a theory for the purposes of this question) whose relevance to human-centered computing has emerged since 1990. Briefly (1 paragraph) describe the historical origins of this theory as it relates to the design and evaluation of computing artifacts. Provide an example of an appropriate application of this theory to the design or evaluation of a computing artifact.

(f) Give a specific limitation of the theory discussed in your answer to part (e) as it relates to the design or evaluation of a computing artifact. Provide an example of a design situation in which your theory would not be the most appropriate theory to use.

Section B: Special Topics in HCI
Ubiquitous Computing—answer ONE of questions 5 or 6

Q5. In a ubiquitous computing environment, the "users" are people going about their everyday lives, with ~~a~~in ~~a~~ll of the the~~ir~~ social richness that entails. In their review of ubiquitous computing research in the 1990's, Abowd and Mynatt suggest three ~~features~~ themes of ubiquitous computing applications: Natural Interaction, Context-Awareness, and Automated Capture and Access.

(a)Show how all three of these themes either independently or through their integration ~~have features that~~ interact with the social norms of privacy and personal control ~~and~~ that people assume in given social situations. Illustrate your answer with a specific use of ubiquitous computing in either a public space, educational institution, business, or domestic environment.

(b)In the example use you gave for part (a), explain how technological advances might address some of the privacy and control issues you described. Try to support your answer with research contributions that have been published in the ubicomp literature.

(c)Technological solutions are not the only way to address privacy and control issues. Discuss how social, market and/or legal approaches might also address privacy and control issues for your example. Again, support your answer with evidence from the ubicomp literature.

~~(a) What are the challenges facing ubiquitous computing research in the design and evaluation of technology that can be made flexible to different norms?~~

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Q6. In automated capture and access applications, one popular objective is to provide seamless capture, that is, a capture system that minimally intrudes upon the normal activities of the captured experience.

(a)~~(a)~~ Picking a specific capture and access system reported in the literature (please tell us what the system is) explain how this ~~objective~~objective of minimal intrusion was or was not achieved.

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(b)~~(b)~~Using the Cognitive Walkthrough evaluation method as your guide, define a formative evaluation technique that might be used to predict the level of seamlessness of a proposed capture system for a specific type of live experience.

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(c)How would you demonstrate the effectiveness of the evaluation method you described above?

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Section B: Special Topics in HCI
Information Visualization—answer ONE of questions 7 or 8

Q7. There are lots of tree Information Visualizations. Most are categorized as being either space-filling or link-node. Within each of these two categories we find many different examples. And for any one example, there are various ways to visually encode link or node attributes, and multiple interaction methods (details on demand, dynamic query, semantic zoom, etc) are possible.

If a user with a tree comes to you asking you to create a useful InfoVis of the tree, you will ask the user a lot of questions. Based on the answers to your questions, you will then decide on the best tree InfoVis for the user's needs. *This exam question is about the decision logic you would use in translating the user's answers into a recommended InfoVis.*

To provide a bit more structure, let's suppose you are writing a program to automatically generate a tree InfoVis. The programs inputs are: meta data about a tree; an indication of what aspects of the tree are of greatest interest to the person who will use the InfoVis (the user's goals), and of course the tree itself.

Your questions to the user concern the meta data and the user's goals.

The meta data you obtain will be things like the depth and breadth of of the tree, the total number of nodes and links, and data types for all the information (aka data, variables) associated with the nodes and with the links (nodes and links can each have multiple pieces of information).

Some examples of user goals/interests are:
"overall tree structure"
"overall tree structure, with emphasis on how many links come out of each node and the value of the xyz variable associated with the link"
"how the node variable revenue and the node variable profit are distributed across all nodes of the tree."

(a) Your task is to write a set of decision rules, based on the user goals/interests and the tree meta data, that could be used to choose a specific tree InfoVis: A specific type of space-filling or node-link diagram Visual encodings, if needed, of the (potentially multiple) data variables associated with the links and nodes Interaction method(s), if needed, that are made available

We know you can't write a complete set of rules in the time available for answering this question. We want you to get started by writing as many rules as time allows. We're looking for you to demonstrate that you understand the situations in which various tree InfoVis-es, visual encodings of link and node attributes, and interaction methods are appropriate.

In your rules, be sure to consider cases there there are multiple node and link attributes, and take into account the data types of the attributes. Also, be sure to take into account the size of the tree.

Express your rules in the general style of IF - THEN rules:
IF user interest is such and such AND something about tree meta data is such and such
THEN include dynamic query on link attribute such and such...

Q8. Ben Shneiderman's InfoVis Mantra of "Overview first, zoom and filter, then details on demand" has been used so much in the community that it has almost become a cliche. Consider the mantra, and then choose one of the following two positions to support.
-- The Mantra has been used so often for good reason. It really does describe the dominant design paradigm in infovis systems.
-- The Mantra is too simple and this simplicity is what leads it to be used so frequently, not appriateness. Many systems do not follow that paradigm (with good reason), nor should others feel obligated to do so.

Whichever position you choose to agree with, strongly defend your position by arguing why you think it is so and include multiple examples from the research literature that support your position.