

UNIVERSITY OF AUCKLAND

FIRST SEMESTER, 2009

Campus: City

Software Engineering 350 & Computer Science 345

TEST

(Time Allowed: 50 Minutes)

Note: This test contributes 15% to your final grade.

Attempt all questions.

Write your answers **legibly** on this paper.

Overflow space is available at the end of the paper, note at end of original space if you have extended your answer into the overflow space

| Question | Out of | Marks |
|-------------------------------|---------------|--------------|
| Section 1 | | |
| 1. Fill-in-the-blanks | 20 | |
| Section 2 | | |
| 1. Execute Evaluation Cycle | 10 | |
| 2. Interaction Styles | 5 | |
| 3. Mental Models | 5 | |
| 4. Hierarchical Task Analysis | 5 | |
| 5. Fitts' Law | 5 | |

| | | |
|--------------|-----------|--|
| Total | 50 | |
|--------------|-----------|--|

| | | |
|-------|------|-----|
| Name: | UPI: | ID: |
|-------|------|-----|

CONTINUED

This page is deliberately left blank

Section 1

1. In 1945 Vannervar Bush described a device, which he called a *memex*, it had many of the features of our modern day desktop computers.
2. *augmented reality* _____ systems attempt to seamlessly integrate the real and virtual worlds.
3. The distance between what people want to do and the meaning of an interface element is the *semantic* distance
4. The distance between the physical appearance of an interface element and what it actually means is the *articulatory* _____ distance
5. Interaction designers often use *metaphors* _____ of similar real world objects and actions in an attempt to make it easier for users to understand the system.
6. The two main types of prototypes are throwaway prototypes and *evolutionary* _____ prototypes.
7. During the discovery phase the first set of questions the designer should be asking are described as the *5w + h* _____ heuristics.
8. Information can be gathered from potential users by passive direct or indirect *observation* _____ or by various elicitation methods.
9. An archetypical description of an imaginary user that is created and used during the design process is called a *persona* _____
10. A *scenario* _____ describes a way that the archetypical user may interact with the system.
11. Nielsen's heuristics is a set of guidelines that designers can use to evaluate the likely *usability* _____ of an interface.

12. The basic layout of a website that is used on all the pages in the site can be described as a

wireframe

13. Comprehensibility and *learnability* are linked in that if you cannot understand something you cannot learn it.

14. The fact that a pair of familiar three-letter-acronyms (like 'IBM' and 'USA') can be activated from Long Term Memory as two *chunks* makes them easier to keep in Working Memory than six random letters.

15. CPM-GOMS maps task durations using the critical path method and assumes that perceptual, cognitive, and motor processors function in *parallel*.

16. The *three state model (or state transition model/state transition diagram)* is capable of describing three types of pointer movements: tracked, dragged and disengaged.

17. One application of the *Glimpse* model is:

Any of: Pan and zoom interfaces; navigation in a 3D world; color selection; volume control; window control; scrollbar manipulation; preview sections of a document (really anything like 'previewing')_ .

18. What must be true about a menu for Hick's Law to apply?

Menu listing order must be logical and relevant" (anything with roughly this meaning); also acceptable: each item has the same probability of selection .

19. Formcharts are bipartite state transitions diagrams where all transitions go from a *screen (or form)* *to a _server (or system)*, or vice versa (must get both correct).

20. JButton, JList and JPanel all inherit from (circle one):

i) Label

ii) JLabel

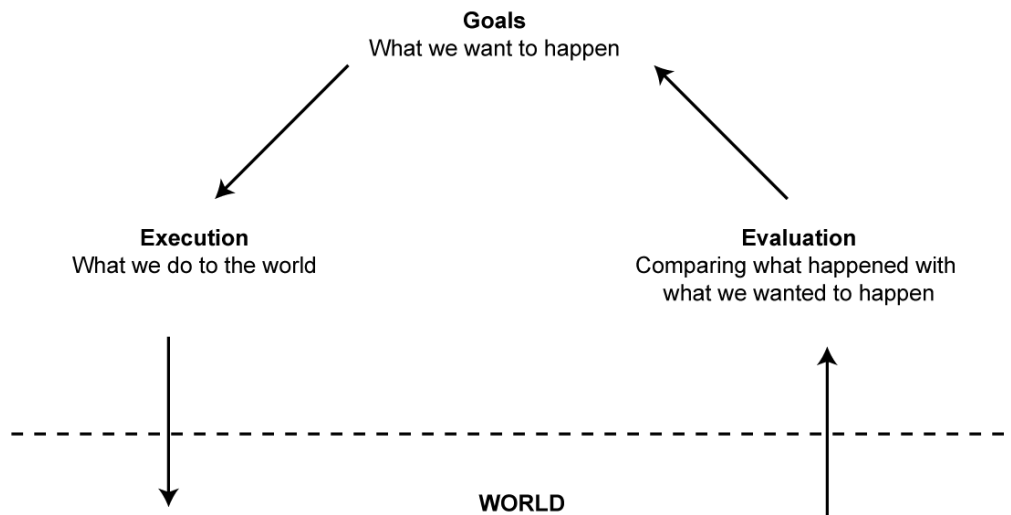
iii) Container

Section 2

1. Execution/Evaluation Cycle

10 Marks

- a. Norman describes human computer interaction in terms of the execution evaluation cycle. Draw a diagram of this cycle and briefly describe the **four** parts of it.



- i. **Goals:** We begin with some idea of what we want to happen; this is our goal.
- ii. **Execution:** We must then execute an action in the world.
- iii. **World:** To execute and action, we must manipulate objects in the world.
- iv. **Evaluation:** Finally, we must validate our action and compare the results with our goal.

- b. Consider the sequence of screen shots of Land Transport NZ's toll payment website shown at the end of the test. The black arrows indicate the user's clicks and the open arrows indicate the sequence of the screen shots. Describe the interaction that has taken place in order to produce them in the terms of the execution evaluation cycle.

Goal: Pay a toll

Execution: click "manage your account" on menu

World: changes to screen 2 (login screen)

Evaluation: does not meet goal

Goal: go back to home page

Execution: click back button

| |
|---|
| World: changes back to home page, screen 3 |
| Evaluation: goal has been met |
| Goal: pay a toll |
| Execution: click "pay a toll" on menu |
| World: changes to pay a toll page, screen 4 |
| Evaluation: goal has been met |

2. Interaction Styles 5 Marks
 Compare **command line** interaction and **GUI** interaction styles giving the advantages and disadvantages of each

Core answers – each worth one mark (gives 4 marks out of the 5)

1. Advantages of CLI: must include “flexibility” or something very similar
2. Disadvantages of CLI: must include “requires recall rather than recognition”, or “large articulatory distance”, or something very similar
3. Advantages of GUI: must include “promotes recognition over recall”, or “smaller articulatory distance”, or something very similar
4. Disadvantages of GUI: must include “slow for expert users” or something very similar

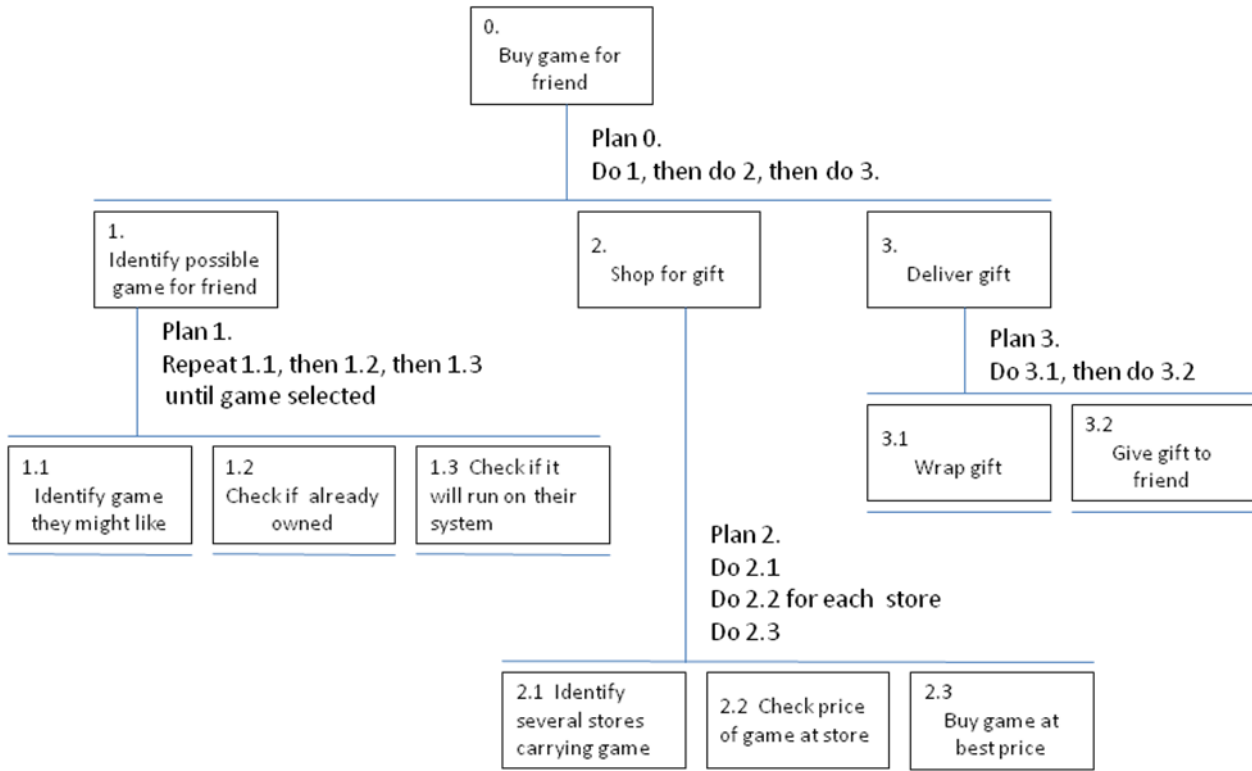
Extra answers – one or more required for the final 1 mark

- Advantages of CLI: actions can be chained; no switching between devices (e.g. keyboard and mouse); typically no way to undo/reverse actions
- Disadvantages of CLI: lack of feedback; often no consistency between applications; prone to errors; difficult/impossible to multitask
- Advantages of GUI: helps with creating a mental model; can use real-world metaphors; more consistent UIs between applications
- Disadvantages of GUI: heavy graphics may cause slow response times; more scope for bad metaphors; typically requires mouse and keyboard

4. Hierarchical Task Analysis

5 marks

Create a Hierarchical Task Analysis graph (with plan annotation) for the task of buying a video game as a gift for a friend. Consider such aspects as assessing what they already have, what their system can run, comparison shopping on price and of course the actual acquisition and delivery of the gift. Create an analysis with at least three levels and around 8 leaf-node tasks.



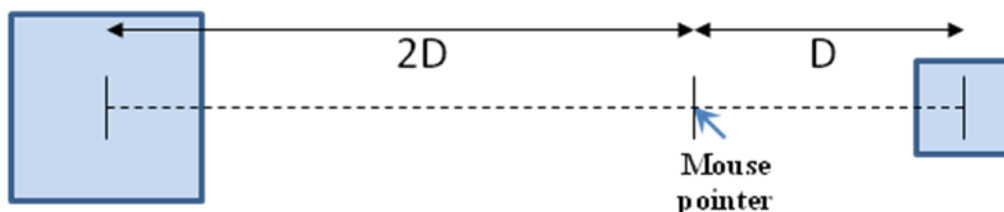
5. Fitts' Law

5 marks

(2 marks)

- a) Consider the Google Maps result page shown at the end of this test. Assume the mouse pointer is a few millimetres right of the text cursor in the editable field showing "46 Queen St, Auckland Central, 1010". What, according to Fitts' Law, would be the most efficient target to aim for if selecting Google's street view using the mouse? Explain why.

___ The small *image* of the street view: it's a little closer to the cursor than the street view link and much wider along the angle of approach, both of which reduce time according to Fitts' Law _____



(2 marks)

- b) Consider that you have two square targets each of which can be approached by moving the mouse pointer horizontally (see diagram above). One target has four times the area of the other, but is twice as far away from the mouse pointer's present position. Describe, according to Fitts' Law, how the time to point at each target differs (you should *not* need a calculator). Explain your reasoning.

___ Left square is exactly twice as far away *and* exactly twice as wide on angle of approach as compared to square on right. $MT = a + b \log_2(A/W + 1)$... key term is A/W ; $2/2=1$ thus time is *the same* according to Fitts' Law for either target. _____

(1 mark)

- c) Why is it better for a mouse pointing target to be directly up against the edge of the screen (if your system style permits this)? Explain.

___ Any overshoot of the target will be nullified by the screen edge, so, from a Fitts' Law perspective, the target has 'infinite' width in that direction. _____

Diagrams for Part 2

Diagram for Question 1(b)

This screenshot shows the 'Tollroad home' page. The navigation menu includes 'Home', 'About the NZ Transport Agency', 'Info about ...', 'Info for ...', 'Do it online', and 'Newsroom'. The breadcrumb trail reads 'You are here: Home > Tollroad > Index'. The main content area features a 'Tollroad' logo, a central image of a toll plaza, and a 'Welcome to tollroad online' message. A sidebar on the right, titled 'Tollroad services', contains several buttons: 'Manage your account', 'Pay a toll', 'Open an account', 'Pay as you go balance', and 'I received a toll notice'. Below these buttons are links for 'Schedule of fees', 'Customer agreement (pre-pay)', 'Statutory declaration form', 'Terms and conditions', and 'Privacy policy'. A black arrow points to the 'Pay a toll' button.

This screenshot shows a web browser window with the URL 'https://tolling.nzta.govt.nz/Selfcare.aspx'. The browser's address bar and menu bar are visible. The page content includes the NZ Transport Agency logo and the text 'Visit NZ Transport Agency WebSite www.nzta.govt.nz'. A 'Customer Login' section is present with input fields for 'Customer ID/Username' and 'PIN', and a 'Login' button. A black arrow points to the browser's address bar.

This screenshot is identical to the top-left screenshot, showing the 'Tollroad home' page. A black arrow points to the 'Pay a toll' button in the 'Tollroad services' sidebar.

This screenshot shows the 'Pay a toll' page on the NZ Transport Agency website. The breadcrumb trail reads 'You are here: Home > Tollroad > Payment > Pay a toll'. The page features a 'Pay a toll' section with detailed instructions for users, including information about advance payments and refunds. A sidebar on the right contains links for 'Schedule of fees', 'Customer agreement (pre-pay)', 'Statutory declaration form', 'Terms and conditions', and 'Privacy policy'.

Diagram for Question 5(a)

