Quiz 1

This quiz is closed book, closed notes. You have 80 minutes to complete it. Each question has enough space for a complete, concise answer, but an additional blank page is included at the end if you find it necessary to continue your answer.

Your name: _____

1. (6 points) Here are three user interface design problems. Which dimensions of usability are most important for each problem, and why?

    a) A nuclear power plant's control console.

    b) The flight controls of a passenger airliner.

    c) A web site for making a Reg Day appointment with your advisor.

2. (3 points) How is perceptual fusion related to computer response time?
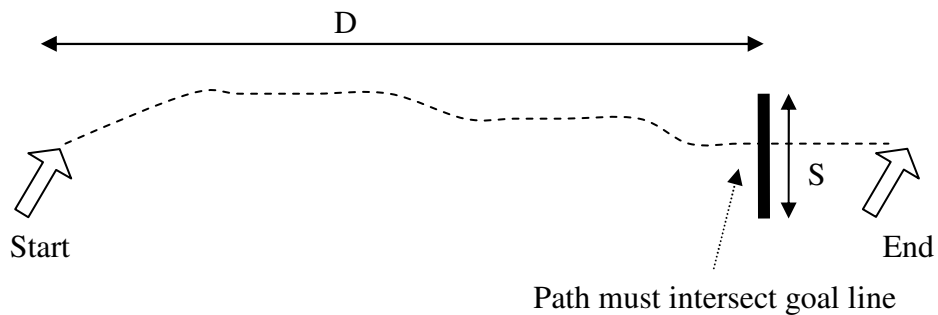
3. (6 points) Suppose you are designing a kiosk for people taking the written part of their driver's license test. Do a user analysis for this problem below. Be as thorough as you can.

4. (3 points) On his first day on the job, Joe Hacker is handed a detailed specification of a user interface to implement. If his company is following the waterfall model, then where did this specification come from, and what's the risk? If his company is following the other model we discussed in class, then where did this specification come from?

5. (3 points) Suppose that a user interface requires the user to move their mouse or pen so that its path intersects the goal line, as shown below. This is called a *goal crossing* task, in analogy to crossing a soccer goal line. What is the index of difficulty of this task as a function of D and S? (Constants can be omitted.)

Path must intersect goal line

6. (3 points) The *lasso selection* tool in a graphical editor allows the user to trace the outline of a shape to select. How does the time T that it takes to make a lasso selection depend on the perimeter P of the object (measured in pixels) and the desired precision C (also measured in pixels)? Explain how you found your answer.

7. (3 points) Dale says, "Never put red and blue next to each other in an interface, because it may be hard for some people to tell them apart." Do you agree with this statement? Explain.

8. (3 points) You're studying an implementation of an MVC design, and you notice that the model is calling repaint(). What's wrong with that? When would it be okay for a *controller* to call repaint()?

9. (3 points) Draw a model-view-controller architecture for a spreadsheet, with a brief description of the specific responsibilities of each part.

10. (3 points) Describe 2 important issues in the design of the interface between the spreadsheet's model and view.

11. (3 points) Louis Reasoner proposes skipping the event interface between the spreadsheet's model and view, and simply having the controller tell the view to update itself whenever the user edits a spreadsheet cell. What's the flaw in his idea?

12. (3 points) Suppose the scrollbar shown on the right is internally implemented by at least 4 components. Draw a view hierarchy for it, labeling each object with its function and a little picture of what it should paint on the screen. The top-level component is shown.

Scrollbar

13. (3 points) In order to produce the usual scrollbar behavior, which components would you attach mouse event handlers to, and (briefly) what would each handler do?

14. (3 points) Explain how z-order affects drawing and input handling.

15. (3 points) Louis Reasoner is writing the paint() method for his application window, and for fun he decides to fill the entire screen with a shocking green color. He sets the color correctly, determines the width and height of the screen correctly, and then makes a call to fillRect(0,0,screenWidth, screenHeight). But fillRect() doesn't do what he expects it to. Give two reasons why he's wrong.

16. (3 points) Consider the conventional "inverted-T" arrangement of keyboard arrows shown below. Is it internally consistent? Is it metaphorically consistent? Explain.
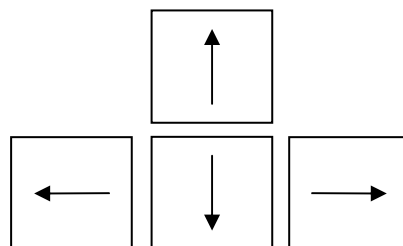
17. (4 points) The code below shows a simple model that fires events. Find two bugs in the event-firing mechanism, and explain why.

```java
public class Square {
 private double side;
 private double area;
 private Set<SquareListener> listeners = new HashSet<SquareListener>();

 public Square(double width, double height) {
  this.side = side;
  this.area = side * side;
 }

 public double getSide() { return side; }
 public double getArea() { return area; }

 public void setSide(double side) {
  this.side = side;
  for (SquareListener l : listeners) { l.squareChanged(this);  }
  area = side * side;
 }
 public void addListener(SquareListener l) { listeners.add(l); }
 public void removeListener(SquareListener l) { listeners.remove(l); }
}

public interface SquareListener {
 public void squareChanged(Square square);
}
```

18. (3 points) Joe says, "When a web browser window is maximized so that its scrollbar is on the right edge of the screen, mouse capture makes it easier to hit it." Do you agree with this statement? Explain.

19. (3 points) Why are timestamps stored in events?

20. (3 points) Draw the state diagram for a command button, such as the OK button of a dialog box. Consider only mouse events; ignore keyboard events.

21. (3 points) Briefly state the responsibilities of the 3 roles for the design team in a paper prototype test session.

22. (3 points) List three dimensions of usability, and for each one, list one design principle that helps improve that dimension.

23. (3 points) Describe a mode found in every automobile interface that could lead to a serious mode error.

24. (3 points) Is a web page a direct manipulation interface? Explain.

25. (3 points) What are the primary affordance cues that tell a user how to use a web page?

26. (6 points) Suppose the component hierarchy shown below is implemented in a conventional GUI toolkit, like Java Swing.
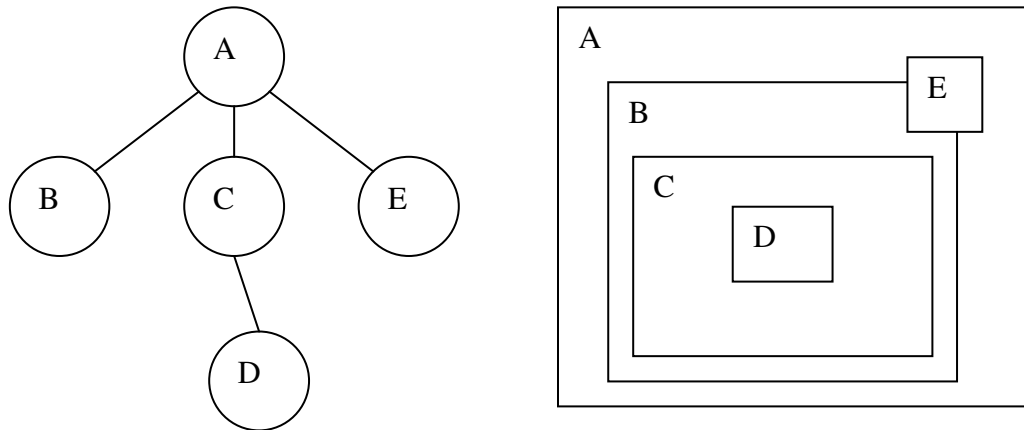
a) If the entire area of C is damaged, which components need to be repainted, and in what order?

b) If the entire area of E is damaged, which components need to be repainted, and in what order?

c) If D has the keyboard focus, and the user clicks on C, then which components can receive the click event, and in what order?

27. (3 points) Suppose you are implementing the output view of a text editor. How could each of the three output models we discussed be used to implement text display?

28. (3 points) In both the RGB and HSV color models, (0,0,0) is **black**. What is **white** in the RGB and HSV models?

29. (3 points) You want to make a paper prototype of the interface you're designing, but your colleague doesn't. Give two reasons to support your position, and one reason that your colleague might give against it.

30. (3 points) What's similar about a paper prototype and a Wizard of Oz prototype? What's different?

END OF QUIZ

Extra space if needed

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