Name: **ID Number:**

CS 4470 — UI Software — September 18th 1999

Midterm Exam #1

1. *(20 points)* The following are worth 4 points each.

a) A typical CRT display has 5 wires connecting it to the computer. 2 of them are the signals that allow the monitor and the display to synchronize. What are the other 3?

b) What is a color gamut?

c) What does CMYK stand for (what does each letter stand for)?

d) What does HSV stand for?

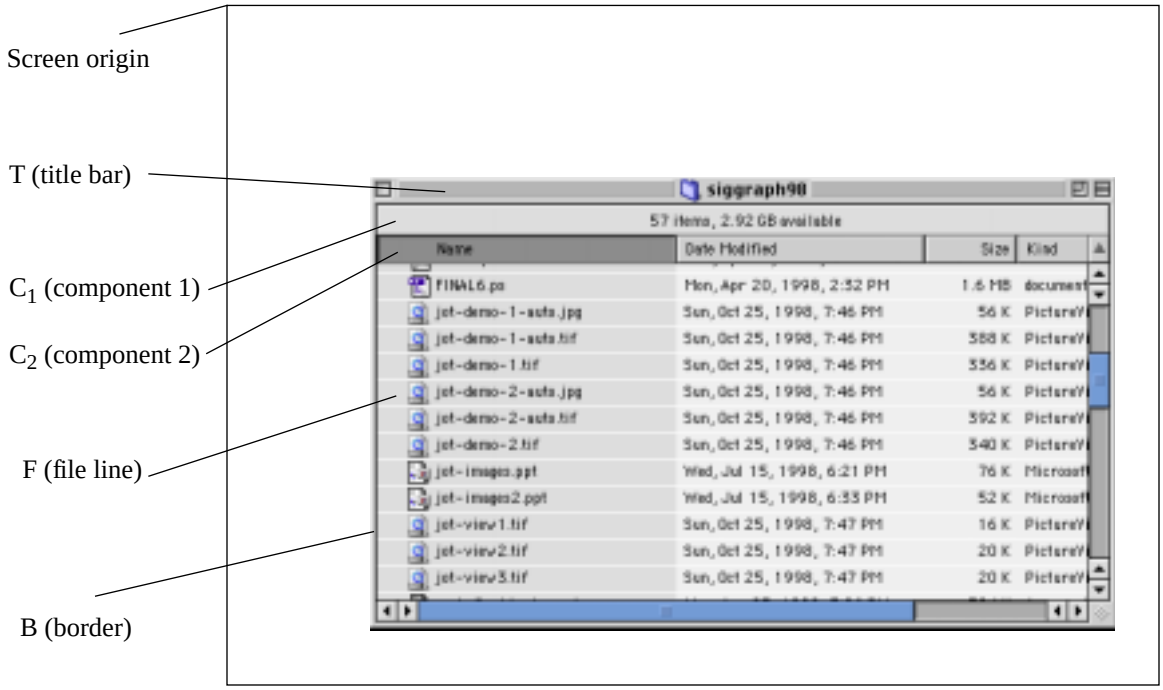
e) What is a metamer?

2. (*10 points*) There are two dominant metaphors for computer interfaces. Describe them and highlight the differences between the two. Can we use finite state machines or grammer based approaches for these metaphors? Why or why not?

3. (*10 points*) Most systems that use input events provide a hierarchy of events that contain progressively more detailed information about the events. The event at the root of such an event hierarchy contains information that is provided to all events. What information would you expect to see in this root event?

4. *(15 points)* Assume you are writing a file browser like the Macintosh Finder. You need to figure out what file a user clicks on when they click in a window, such as the "SIGGRAPH98" one shown below. The window consists of a border around the entire window (B) with a component W inside of it. This component W contains two children, a title bar (T) and a component C containing the window contents. This components C consists of 3 horizontal components C_1 (showing the number of items), C_2 (showing the column titles) and C_3 (a scrolling pane containing 2 scrollbars and a component P for the pane contents, which are a vertical array of file line widgets F_i).

   Show the expression you would use to compute which file component the user clicked on in the scrolling list of file components, assuming you obtain the mouse position M reported to the panel contents component P in screen coordinates.



   You may assume that each component has fields you need (including an X and Y position specified relative to the parent component, a width W and heigh H). The scrolling pane has fields PX and PY, which are the X and Y location of the upper left corner of the visible part of the pane contents component, in the coordinate system of the pane.

5. (*10 points*) One fundamental difference between the X window system and the NeWS window system is that NeWS allows program code to be downloaded into the window system server. Give an example that illustrates a significant advantage (over X) of this facility to download code (and say what the advantage is).

6. (20 points) In class, we discussed event handling in the context of a multi-threaded, object-oriented toolkit like Swing.

a) Sketch what the event loop would look like (i.e., write it out in pseudo-code) in such a toolkit.

b) What are some reasons that we might we want to use multiple threads to handle event dispatch?

c) In class, we discussed why a single thread is typically used to handle all event dispatch. Why are multiple threads generally not used to handle incoming events.

d) Why did you put the redraw where you did in the above psuedocode?

7. (15 points) Window systems provide a *virtual device* abstraction. What are some motivations for providing such an abstraction?