1. (40 points) The web protocol (HTTP) is described as a client/server protocol.
   a. List the steps involved in browsing an HTML page, starting with the user typing the URL into a browser window. Be specific, including operations by the client/browser and web server. Indicate the application-layer messages that are exchanged. You may assume that the page has no embedded images or other dependent files.

1. User types a URL and presses "Go" button or presses "Enter".
2. Browser generates an HTTP request to the server indicated in the URL and sends it.
4. Server locates HTML resource identified in request and generates a HTTP response with the HTML document as the body
5. Server sends response message to the browser
6. Browser receives HTTP responds, processes it and displays the HTML document to the user.

b. What would be different about your answer if the page contained an in-line JPEG image?

Step 6 would be different. As the browser processes the HTML document, it will find the img element and generate a new request, causing steps 2-5 to occur again with the URL from the src attribute. Then the contents of the image will be displayed as part of the page shown in part a.

c. What would be different about your answer to question a if instead the user were clicking on a hot spot in a client-side image map?

Step 1 would be different. The user would click on a spot in the image map, generating a coordinate. The browser would then compare this coordinate to the defined area elements in the imagemap, and locate the area element that contains the user's click point. The href attribute of this element would then be used as the URL and steps 2-6 would be the same.

d. What would be different about your answer to question b, if instead the user was clicking submit on an HTML form?

Step 1 would be different, replaced by the submit button press. Step 2 would also be different: the request must contain all of the data that the user has entered on the form as name:value pairs. Step 4 would be different. The server would invoke a web application to process the data in the form, and the web application would produce HTML as output. Steps 5 and 6 are then the same.