1. **Problems to be turned in**:
   1. **CAT Scan** (from Decker & Hirshfield)***(15 points)***

To give you an idea of how much computational effort a CAT scan requires, consider a simple problem of determining the composition of a two by two grid, in which each cell can be *filled* or *empty*. The 16 possibilities are:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | | |  |  | | --- | --- | |  |  | |  |  | |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

1. Your scanner can send a beam through the grid in one of six ways (along the bottom row, the top row, the left column, the right column, or either of the two diagonals) and record the number of filled cells the beam sees (0, 1, or 2). Scanning just the bottom row and the top row is not sufficient to distinguish all possible patterns because those two scans cannot tell the difference between patterns 1 and 2 or among patterns 5, 6, 9, and 10.
   * 1. Show that no two scans can distinguish all possible patterns.  *Hint*: Compare the number of possible values for the two scans with the number of possible patterns.
        + Any scan involving a direction must be matched by its counterpart (left with right, top with bottom) in order to cover all parts of the box. Any other combination of two will leave a part of the box un-scanned. The problem with two scans is that it is not able to identify whether the box is in the left cell or the right cell, thus being unable to distinguish the patterns.
     2. Find a collection of four scans that will suffice.
        + Using up, down, left, right should suffice.
     3. Prove or disprove: There is a collection of three scans that will distinguish all patterns.
        + No set of three scans will allow you to differentiate all patterns. Top, bottom, and left is disproved because it can’t tell the difference between 6 and 9. The same is true with from the right. Top, bottom, and diagonal is disproved because it can’t tell the difference between 5 and 10. The other diagonal is also disproved by this. The last being top, right, and diagonal .This is disproved because it can’t tell the difference between 11 and 4.
   1. Visit the article [XHTML™ 1.0 The Extensible HyperText Markup Language (Second Edition)](http://www.w3.org/TR/xhtml1/) (http://www.w3.org/TR/xhtml1/) and read the following sections:
      1. 1. What is XHTML?
         * Sections 1.1-1.3
      2. 4. Differences with HTML 4
         * Sections 4.1-4.6

Discuss what changes you would need to make to your **schedule.html** document (see "A Web Page (Schedule)" problem below) in order for its content to be XHTML-conforming. You may restrict your discussion to those items covered in the listed readings. ***You don't have to make your document XHTML conforming -- just discuss what changes would need to be made. (10 points)***

* Fix the values of border and cellpadding with quotation marks.
  1. Suppose you have a collection of CDs, and you want to create a library of them. You decide to create the library in XML format for future extensibility, portability, and to get 10 points for your CS homework. Create an XML representation for a CD collection, and create an XML *document* that describes at least three CDs from your collection. *You do not need to create an XSL stylesheet for this exercise. You do not need to create an XML Schema Definition (XSD).*

Your assignment is to determine a model for the structure and elements of an XML sheet -- so all you have to do is define these elements, then create an XML document that conforms to them. ***(10 points)***

<cd>

<id>1</id>

<album\_title>Mhmmm</album\_title>

<artist>Relient K</artist>

<no\_of\_tracks>13</no\_of\_tracks>

</cd>

<cd>

<id>2</id>

<album\_title>Paramore</album\_title>

<artist>Paramore</artist>

<no\_of\_tracks>11</no\_of\_tracks>

</cd>

<cd>

<id>3</id>

<album\_title>Black Holes and Revelations</album\_title>

<artist>Muse</artist>

<no\_of\_tracks>12</no\_of\_tracks>

</cd>

1. **A Web Page (Schedule) *(50 points)***

You are to complete a [web page](https://www.cs.drexel.edu/~introcs/Fa13/assignments/HW3/schedule.html) that someone has started for you. On this page, you will enter your class schedule into a table, so that anyone on the web can find out where you are at any time!

In particular you should make the following changes/additions to the schedule page.

* 1. Change the name on the page to your own. Format your name to appear in a font and color of your choosing. You can find a list of *color names* at the W3Schools' [CSS Color Names](http://www.w3schools.com/cssref/css_colornames.asp)(http://www.w3schools.com/cssref/css\_colornames.asp) . These color names are valid for HTML and CSS usage.
  2. Format the page to a background color of your choosing.
  3. Add rows to the table, so that it can cover the hours from 8 am to 5 pm in increments of half hours. (*Hint*: Use copy and paste).
  4. Insert ***your*** classes into the schedule. Include the course ID, title, and room that the class meets. To block the class across several rows, you will need to put the attribute**ROWSPAN="2"** or**ROWSPAN="3"** in the **<td>** tag. (See the entry for CS 164 on the web page given to you). If a table entry spans several rows, you will have to *remove* the **<td>** entries from the other rows. (Again, refer to the original web page given to you - note that the rows after 12:30 seem to only have 4 entries).
  5. Add color to your table. You should choose a background color for your table different from the rest of your page. Each class should have its own color. For example, your CS class should be a different color than your calculus class, but all of the times your calculus class meets should be the same color.
  6. Insert *comments* (using the <!-- ... --> tags) near the top of the document which give your name, email address, and the date.
  7. Inside the **<head>** section, include a **<title>** element, (such as "*Your Name* Fall Term 2013 schedule").
  8. Insert at least one picture on the page (not necessarily as a table element).

**Note: You must make these changes by editing the HTML code directly. You cannot use an HTML editor!!!**

1. **Web Page Revisited, with CSS *(15 points)***:  
   *Cascading Style Sheets* (CSS) allow style descriptions for a page's elements to be separated from the elements' definitions. The page [Cascading Style Sheets](https://www.cs.drexel.edu/~introcs/Fa13/notes/03.3_References/CSS.html?CurrentSlide=6)(https://www.cs.drexel.edu/~introcs/Fa13/notes/03.3\_References/CSS.html?CurrentSlide=6) describes briefly how to change a page's default font and color by using a **<style>** section. It is also possible to specify table layout properties with a style sheet, by individually defining style rules for **table**s, **td** elements and **th** elements in a similar fashion, using **table { ... }**, **td { ... }**and **th** **{ ... }** descriptions, respectively in the **<style>** section.

See *Supplemental Material and Exercises* from Reed, Chapter 2, pp.36-39: Exercise 2.14-2.15. Using [schedule-wCSS.html](https://www.cs.drexel.edu/~introcs/Fa13/assignments/HW3/schedule-wCSS.html) (https://www.cs.drexel.edu/~introcs/Fa13/assignments/HW3/schedule-wCSS.html) as a guide, insert a **<style>** section in your **schedule.html** file that defines the default cell background color, font size and color in a table cell, and remove those attributes from the table elements in the previous exercise. (The attribute **background-color** will be helpful. You can find a list of CSS style attributes at [W3Schools CSS Reference](http://www.w3schools.com/cssref/default.asp) (http://www.w3schools.com/cssref/default.asp) ) Show the results for two different sets of style attributes.

 **Extra Credit**

1. A good practice for web designers is to include **META** tags in their pages in order that their intended content may be communicated. In particular, search engines make use of this knowledge in order to point users to the pages when the content they search for includes the given tag. Research how to create such **META** tags for web pages, and include some appropriate tags for the web page you submit for this assignment. ***(5 points)***
2. Search engines employ many methods to gather information from the web and catalog it for fast retrieval when a user does a search. One method is to use so-called "spiders" that "crawl the web" and report back the pages they find and the pages' URL's, then to follow those pages' links to the next location(s). If you have a page on the web, a spider may eventually find it and it will then show up when you search for it by its content. This is a "hit or miss" prospect that may require a relatively long wait, however. Are there other ways to make your pages get noticed? Research this and report on it. ***(5 points)***