These are some practice problems for your final. These problems only cover the "new" material we have covered since the last exam. However, your final will be cumulative, with approximately 50% on the "new material", 25% on the material also covered by Exam 1, and 25% on the material also covered by Exam 1. In addition to these problems, I recommend you:

- review the previous tests
- try the end of chapter problems - I'm more then happy to check your answers if you're unsure of any of them.
- review the practice problems from the previous exams
- review any in-class problems, worksheets, and activities

The exam will be very similar to the previous exams in format. Some multiple choice, some multiple answer, some code writing, etc. It will be closed book, closed notes.

Material you are responsible for:
- From the textbook
  - Chapters 1-8
  - Chapter 9, pp 156-162
  - Chapter 11-12
  - Chapter 14
- Anything we have covered in class such as extra history, Watson, etc.
1. Consider the following code snippet. Describe what the user will see when it is executed.

```javascript
x = 0;
y = 5;

if (x < y) {
  x = x + 1;
y = 2;
  alert('Stage 1');
}

if (x == 0) {
  x = 4;
y = 6;
  alert('Stage 2');
} else {
  x = 2;
y = 10;
}

alert('The value of x is ' + x);
alert('The value of y is ' + y);
```

User will see three alerts with 'Stage 1', 'The value of x is 2', and 'The value of y is 10'.

2. Evaluate the following boolean expressions
   (a) true && true
       true
   (b) true || false
       true
   (c) false && false || true
       true
   (d) ! (6 == 3 * 2)
       false
   (e) (! (8 == 9-1)) && (16 != 2 + 6 * 2)
       false

3. Write a snippet of code in JavaScript (e.g. you do NOT have to define a function or write HTML code) which does the following:
   (a) uses two variables: temp and cold which represent the current temperature and the temperature at which the user feels cold.
   (b) if the current temperature is lower than the point at which the user feels cold, your code should display an alert telling the user to dress warmly. otherwise, the user should be told that it's nice weather.

   Answers will vary.
   Could be something like:
   ```javascript
   if (temp < cold) {
     alert('Dress warmly. ');
   ```
4. Convert the following decimal numbers to binary:
   (a) 23
       10111
   (b) 65
       1000001
   (c) 1022
       1111111110

5. Convert the following binary numbers to decimal
   (a) 1001111
       79
   (b) 111000111
       455
   (c) 1100010010
       786

6. Interpret the following sequence of bits as
   (a) ASCII characters (table on pg 222 in your book)
   (b) 4-bit binary numbers

   01001000011011110111011100111111
   Ascii: How?
   4 bit numbers: 4, 8, 6, 15, 7, 7, 3, 15

7. Explain the difference between lossy and lossless compression.
   See pg 227.

8. What is meant by sampling analog data? How does this convert analog data to digital data?
   See page 224-225 for a discussion of sampling analog data (sound in this case) and converting it to digital data.

9. A webpage contains the following two code snippets: one written in JavaScript and one in HTML. In your own words explain what will be displayed when the button below is clicked.

   ```javascript
   function mystery(a, b, c) {
       x = a + b + c;
       x = x / 3;
       return x;
   }
   ...
   <input type="button" value="Click me!" onclick="
       z = mystery(12, 1, 2);
       alert('The value of z is: ' + z);
       z = mystery(6, 9, 6);
       alert('The value of z is: ' + z);
   ">
   ``

   This code will display an alert with the message, "The value of z is 5" and then an alert with the
message, "The value of z is 7"
See pp156-162 for a discussion of parameters and return values.

10. Using simple 16-bit machine language 261 of your textbook (Figure 14.10), write a series of bits which represent the following instructions:
   (a) Load the contents of memory location 21 into register 3
       1000000101110101
   (b) Move the contents of register 2 to register 3
       1001000100001110
   (c) Subtract the values in register 1 from register 3 and store the result in register 0.
       101000100001101

11. Explain the purpose of a Program Counter in the Control Unit of a CPU.
    See page 262 in your textbook.

12. How are the registers of a CPU different from main memory?
    See page 254 in your textbook.

13. For each of the images of a simulation below, explain what will happen when the simulation is run.
You can run these simulations at [http://balance3e.com/Ch14/datapath.html](http://balance3e.com/Ch14/datapath.html) and [http://balance3e.com/Ch14/dpandmem.html](http://balance3e.com/Ch14/dpandmem.html) to verify your answers.