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 than 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.
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 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:
   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. Convert the following decimal numbers to 16-bit two's complement format.
   (a) 24
       \[0000000000011000\]
   (b) -24
       \[1111111111101000\]
   (c) -33
       \[1111111111011111\]
   (d) -126
       \[1111111110000010\]
7. 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
8. Explain the difference between lossy and lossless compression.
   See pg 227.
9. 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.
10. In your own words explain what the following code does.

    ```javascript
    num1 = Math.ceil(Math.random()*10);
    num2 = Math.ceil(Math.random()*10);
    while (num1 != num2) {
        num1 = Math.ceil(Math.random()*10);
    }
    ```
This code generates two random numbers between 1 and 10 (inclusive). It continues generating random numbers until they match. It then prints out an alert which gives the value of the two numbers (which will be the same at that point).

11. Consider the following code snippet:
   ```javascript
   x = 4;
   while (x < 10) {
       alert('The value of x is ' + x);
       //comment
   }
   ```

(a) What logic error does the following code demonstrate?
   Infinite loop because x never changes.

(b) What JavaScript statement could you put in place of the //comment to fix the problem?
   Answers will vary. Could be something like `x = x + 1;` or `x = x + 5;` etc.

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

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

14. 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 and http://balance3e.com/Ch14/dpandmem.html to verify your answers.