**COMP 1800 – Fall 2016**

**Homework 1: Number Bases and Binary Numbers  
(40 points)**

Number of People: Individual. Feel free to ask me for help, or visit the Computer Science Learning Center (<http://www.memphis.edu/cs/current_students/cslc.php>).

Due: Thurs., Sept. 8 by 5:30 pm

Submission: Turn in this assignment as a hard copy; no electronic submission is necessary.

Grader: TA, Swaroop Goli ([ssgoli@memphis.edu](mailto:ssgoli@memphis.edu)). Questions about grading? Please contact him first!

As usual, please show all work on these problems! Answers without work will be given minimal or no credit.

1. **(8 pts, 4 each)** Convert the following numbers into base 10:
   1. (1861)9
   2. (BAD)18
2. **(8 pts, 4 each)** Perform the indicated conversions:
   1. (918)10 into base 7
   2. (250)10 into base 16
3. **(8 pts)** Convert (B52)12 into base 8, using base 10 as an intermediate step.
4. **(8 pts)** Consider the color given by the hexadecimal code #E072E4.
   1. *(6 pts)* In base 10, how much red, green, and blue are present in this color? Your answers should be numbers between 0 and 255.
   2. *(2 pts)* What is the full sequence of 24 bits that a computer would store for this color? Hint: remember the shortcut for converting from base 16 to base 2.
5. **(8 pts)** Using the RGB color scheme we discussed, each color is represented using 24 bits of data. Since a picture is just a collection of pixels with colors assigned to them, the theoretical size of a picture is computable by multiplying the number of pixels by the number of bits per color.
   1. *(2 pts)* Use Google Images (images.google.com) to find an image file of your choice. What are the height and width of the image in pixels?  
        
      (You can find this information many different ways. You can save the image to your computer, then right-click > Properties, or do something like <http://osxdaily.com/2011/05/18/show-image-dimensions-in-mac-os-x-finder-windows-desktop/> if you’re on Mac OS. You can open the image in a graphics program. Depending on your browser, you might even be able to right-click the image in your browser and get the dimensions directly from there.)
   2. *(1 pt)* Based on the dimensions above, how many pixels are in your image?
   3. *(2 pts)* Assuming that each pixel uses 24-bit color, how many bits of data are in your image?
   4. *(1 pt)* How many bytes is that?
   5. *(2 pts)* What is the actual file size of your image? Is it larger or smaller than your theoretical number? How might you explain any differences?