

Ma204—Programming with Robots:

Distributed: May 1, 2009

Homework 09a

Due: May 11, 2009

You don't need to submit these exercises to me. They are simply examples of the kinds of calculations you may find on the final exam.

- (1) Give the base-10 equivalent of the following 8-bit byte:

$$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ \hline 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ \hline \end{array} = (?)_{10}$$

- (2) Fill in the 8-bit byte to represent the given base-10 number:

$$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ \hline & & & & & & & \\ \hline \end{array} = 134_{10}$$

- (3) How many different 8-bit bytes are possible?
- (4) What happens to the byte in Exercise 1 if it is multiplied by 4 and we ignore the overflow? What's the new base-10 value of the byte?
- (5) What happens to the byte in Exercise 1 if it is divided by 8? What's the new base-10 value of the byte?
- (6) Fill in the 8-bit byte to represent the given ASCII¹ character:

$$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ \hline & & & & & & & \\ \hline \end{array} = \text{'v'}$$

- (7) Fill in the 8-bit byte to represent the given ASCII character:

$$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ \hline & & & & & & & \\ \hline \end{array} = \text{'2'}$$

- (8) What value should we assign to an int variable so that it holds the ASCII character 'P' in the most significant byte and 'M' in the least significant byte?
- (9) In Exercise 8, what characters are represented if the integer is incremented by 1? By 256?
- (10) What characters are stored in the most significant byte of the integer 26996? In the least significant byte?

¹<http://www.csc.villanova.edu/~tway/resources/ascii-table.html>