

PORTLAND STATE UNIVERSITY  
CS201: COMPUTER SYSTEMS PROGRAMMING (SECTION 5)  
SPRING 2020

HOMEWORK 2  
**DUE: APRIL 20 AT 6 PM (Scan and upload to D2L)**

Instructions:

Show all your work. You must work in this assignment individually.

1. Convert the following binary numbers to hex (8 POINTS):  
(Hint: You do not need to convert to decimal as each group of 4-bits maps exactly to one hexadecimal numeral)
  - a. 0111 1111 0000 0101
  - b. 1111 1111 0000 0000
  - c. 1010 0101 0011 1100
  - d. 0111 1110 1000 0011
2. Convert the following hex numbers to binary (8 POINTS):  
(Hint: You do not need to convert to decimal as each hexadecimal numeral maps to a group of 4-bits)
  - a. ABCD
  - b. D400
  - c. FF00FF00
  - d. 80000000
3. Convert the following decimal numbers to binary (6 POINTS, 3 points each):
  - a. 1325
  - b. 6240
4. Convert the following binary numbers to decimal (6 POINTS, 3 points each):
  - a. 1101 1110 0011 1010
  - b. 1111 0001 0100 0111
5. Add the following binary numbers (4 POINTS, 2 points each):
  - a. 1101 1010 1111 1010 + 1010 0101 0111 1000
  - b. 1000 1111 0101 1110 + 0101 1111 1111 1110
6. Multiply the following binary numbers (4 POINTS, 2 points each):

- a. 1111 1010 x 1011
- b. 1101 1010 x 10000

7. Convert the following binary numbers into decimal (4 POINTS, 2 points each):

- a. 11.10101
- b. 0.11011011

8. Convert the following decimal numbers into binary. Truncate your result to eight binary numerals right of the binary point. Do not round up. (4 POINTS, 2 points each):

- a. 3.1415
- b. 1.187

9. Assuming a 16-bit Two's complement system for signed numbers. Convert the following decimal numbers to binary (6 POINTS, 3 points each)

- a. -1028
- b. 1524

10. Describe the difference between big endian and little endian. Give an example in which you show an integer written in big endian notation and little endian notation to highlight the differences (15 POINTS).

11. From the code below specify where in the executable symbols (i.e Heap, Stack, Text Segment or Data Segment) are stored the following symbols. (15 POINTS)

```
int* global_ptr = NULL;

void func()
{
    int x = 25;
    static int y = 67;
    global_ptr= (int*) malloc(sizeof(int)*50);
}
```

Variable global\_ptr: \_\_\_\_\_

Function func(): \_\_\_\_\_

Local variable x: \_\_\_\_\_

The array referenced by global\_ptr: \_\_\_\_\_

Local static variable y: \_\_\_\_\_

12. Write the following number as an IEEE single precision floating point (10 POINTS)

a. 3.1416 (Binary Format: 11.0010010000111111111001)

13. Describe the 3 types of linking and in which phase relocation and code insertion occurs (10 POINTS)