CS150 - Computer Organization and Architecture
Homework #1 - Spring 2024

1. Convert the following binary numbers to equivalent decimal numbers.

- *(a)* $(00001101)_2$ **13**

- *(b)* $(00010001)_2$ **17**

- *(c)* $(01101101)_2$ **109**

- *(d)* $(11011101)_2$ **221**

- *(e)* $(11111111)_2$ **255**

- *(f)* $(11100.011)_2$ **28.375**

2. Convert the following decimal numbers to equivalent binary numbers.

- *(a)* $(67)_{10}$ **01000011**

- *(b)* $(54)_{10}$ **0110110**

- *(c)* $(255)_{10}$ **11111111**

- *(d)* $(256)_{10}$ **100000000**

- *(e)* $(2416)_{10}$ **100101110000**

- *(f)* $(4096)_{10}$ **1000000000000**

3. Convert the following octal numbers to equivalent decimal numbers.

- *(a)* $(35)_8$ **29**

- *(b)* $(2347)_8$ **1255**

4. Convert the following decimal numbers to equivalent octal numbers.

- *(a)* $(91)_{10}$ **133**

- *(b)* $(132)_{10}$ **204**

- *(c)* $(521)_{10}$ **1011**

5. Convert the following hexadecimal numbers to equivalent decimal numbers.

- *(a)* $(C4)_{16}$ **196**

- *(b)* $(3FF)_{16}$ **1023**

- *(c)* $(BEEF)_{16}$ **48879**

6. Convert the following decimal numbers to equivalent hexadecimal numbers.

- *(a)* $(30)_{10}$ **1E**

- *(b)* $(312)_{10}$ **138**

- *(c)* $(513)_{10}$ **201**

7. Convert the following binary numbers to equivalent octal numbers.

- *(a)* $(11101)_2$ **35**

- *(b)* $(11101101)_2$ **355**

- *(c)* $(10110101)_2$ **265**

8. Convert the following binary numbers to equivalent hexadecimal numbers.

- *(a)* $(101010)_2$ **2A**

- *(b)* $(111100110)_2$ **1E6**

- *(c)* $(11010101)_2$ **D5**

9. Miscellaneous - Perform the following base conversions.

- *(a)* $(341)_5 = (\mathbf{96})_{\mathbf{10}}$

- *(b)* $(76)_{10} = (\mathbf{136})_{\mathbf{7}}$

- *(c)* $(1101001)_2 = (\mathbf{1221})_{\mathbf{4}}$

- *(d)* $(BFE)_{16} = (\mathbf{193A})_{\mathbf{12}}$

- *(e)* $(2112)_3 = (\mathbf{104})_{\mathbf{8}}$

- *(f)* $(7AD)_{16} = (\mathbf{1965})_{\mathbf{10}}$

- *(g)* $(6101)_7 = (\mathbf{2108})_{\mathbf{10}}$

10. Perform the following **binary** arithmetic.

```
a.   01010111                    b.   00100110
   + 00110011                       + 01001111
     --------                         --------
     10001010                         01110101


c.   01010011                    d.   01011100
   + 10111011                       + 00011111
     --------                         --------
    100001110                         01111011


e.   10011011                    f.   01011001
   - 00111011                       - 00011111
     --------                         --------
     01100000                         00111010
```

11. Perform the following **octal** arithmetic.

```
a.   424                         b.   5112
   + 163                            + 1346
     ---                              ----
     607                              6460
```

12. Perform the following **hexadecimal** arithmetic.

```
a.   A4                          b.   7F3
   + 27                            + 41D
     --                               ---
     CB                               C10


c.   806                         d.   56C
   -  4B                            - 2FF
     ---                              ---
     7BB                              26D
```