

CS315 2023F Lab02 Exam Problems Solutions

Question 1 - Hex to Decimal

Convert the hexadecimal number `0x3FA` to decimal. Show your work.

$$\begin{aligned} &A-10 \quad B-11 \quad C-12 \quad D-13 \quad E-14 \quad F-15 \\ &3 \times (16^2) + 15 \times (16^1) + 10 \times (16^0) \\ &3 \times 256 + 15 \times 16 + 10 \\ &768 + 240 + 10 = \boxed{1018} \end{aligned}$$

$$\begin{array}{r} 11 \\ 256 \\ \times 3 \\ \hline 768 \end{array} \quad \begin{array}{r} 3 \\ 16 \\ \times 15 \\ \hline 180 \\ 160 \\ \hline 240 \end{array}$$

Question 2 - Binary to Decimal

Convert the binary number `0b10110` to decimal. Show your work.

$$\begin{aligned} &1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 \\ &16 + 0 + 4 + 2 + 0 = \boxed{22} \end{aligned}$$

Question 3 - Decimal to Binary

Convert the decimal number `231` to binary. Show your work.

$$\begin{array}{llll} \textcircled{1} & 231 \% 2 = \textcircled{1} & \textcircled{2} & 115 \% 2 = \textcircled{1} & \textcircled{3} & 57 \% 2 = \textcircled{1} & \textcircled{4} & 28 \% 2 = \textcircled{0} \\ & 231 / 2 = 115 & & 115 / 2 = 57 & & 57 / 2 = 28 & & 28 / 2 = 14 \\ \textcircled{5} & 14 \% 2 = \textcircled{0} & \textcircled{6} & 7 \% 2 = \textcircled{1} & \textcircled{7} & 3 \% 2 = \textcircled{1} & \textcircled{8} & 1 \% 2 = \textcircled{1} \\ & 14 / 2 = 7 & & 7 / 2 = 3 & & 3 / 2 = 1 & & 1 / 2 = 0 \\ & & & & & & & \text{DONE} \end{array}$$

ANS: 0b11100111

$$\text{Check: } 128 + 64 + 32 + 4 + 2 + 1 = 231$$

Question 4 - Bad string_to_int()

Consider the following incorrect implementation of `string_to_int()`:

```
int string_to_int(char *s) {  
    int result = 0;  
    for (int i = 0; s[i] != '\0'; i++) {  
        result = result * 10 + s[i];  
    }  
    return result;  
}
```

This is the ASCII code. We need to convert the ASCII code to an int: `result = result * 10 + (s[i] - '0');`