# PHY 505 Computational Physics

# Homework 1

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**Problem 2**

10 = 0110

436 = $2^8 + 2^7 + 2^5 + 2^4 + 2^2$ = 011011010

1024 = $2^{10}$ = 01000000000

13 = $2^3 + 2^2 + 2^0$ = 01101. Then to obtain the two's complement of 13 just flip the numbers and plus 1, so -13 = 10011.

1023 = $2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$ = 0111111111. Then to obtain the two's complement of 1023 just flip the numbers and plus 1, so -1023 = 10000000001.

1024 = $2^{10}$ = 01000000000. Then to obtain the two's complement of 1024 just flip the numbers and plus 1, so -1024 = 110000000000.

**Problem 3**

For series $f_n = f_{n-1}^2$ with $f_0 = 2$, we can rewrite the nth term of the series as $f_n = 2^{2^n}$.

(a) The maximum value for *int* in C++ is: $32,767 = 2^{15} - 1$, so the maximum $n$ is 3.

(b) The maximum value for *long int* in C++ is: $2,147,483,647 = 2^{31} - 1$, so the maximum $n$ is 4.

(c) The maximum value for *unsigned long int* in C++ is: $4,294,967,295 = 2^{32} - 1$, so the maximum $n$ is 4.