

# Computational Physics HW1 pro3

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Since  $f_0 = 2, f_n = f_{n-1}^2$ , we have  $f_1 = 4, f_2 = 16, \dots, f_n = 2^{2^n}$ . And now each byte can store 4 bits, we can calculate the maximum value for different data types.

a) For int, having 8 bits, the maximum value it can store is  $2^7 - 1 < 2^{2^3}$ , so the maximum value for  $f_n$  is  $f_2 = 2^{2^2}$  which means the maximum  $n$  is  $n = 2$ .

b) For long int, having 16 bits, the maximum value it can store is  $2^{15} - 1 < 2^{2^4}$ , so the maximum value for  $f_n$  is  $f_3 = 2^{2^3}$  which means the maximum  $n$  is  $n = 3$ .

c) For unsigned long int, the maximum value it can store is  $2^{16} - 1 < 2^{2^4}$ , so the maximum value for  $f_n$  is the same as the condition in long int and the maximum  $n$  is  $n = 3$ .