Consider the twelve functions of n (recall that lg denotes the binary logarithm):

n	n^5	$n \lg(n)$	$n!$	$\sqrt{n}$	$\sqrt[3]{n}$
$\lg(n)$	$\lg(n!)$	$\ln(n)$	2^n	$(1.01)^n$	$700,000$

1. Arrange these functions in non-decreasing order of growth; that is, find an arrangement $f_1 \leq f_2 \leq \ldots \leq f_{12}$ of the functions such that $f_1 \in O(f_2)$, $f_2 \in O(f_3)$, $\ldots f_{11} \in O(f_{12})$. For each i, you should write $f_i = f_{i+1}$ if $f_i \in \Theta(f_{i+1})$, and write $f_i < f_{i+1}$ if $f_i \in o(f_{i+1})$ (unlike the pathological example in Question 2, one of the two will always hold). You do not need to argue for your answers.

2. For each function X, roughly approximate how big n must be in order for $X(n)$ to be at least 100,000, and to be at least 10,000,000,000 (10^{10}).