1. Which of the following two functions has a faster growth rate?

\[ f(n) = \log_3(100n) \]
\[ g(n) = \log_2(n) \]

Justify your answer using the definition of the Big-Oh notation.

2. Rank the following functions by order of growth; that is, find an arrangement \( g_1, g_2, \ldots \) of the functions satisfying \( g_1 = O(g_2), g_2 = O(g_3), \ldots \). Partition your list into equivalence classes such that functions \( f(n) \) and \( g(n) \) are in the same class if and only if \( f(n) = \Theta(g(n)) \).

\[
\begin{align*}
(\sqrt{2})^{\lg n} & \quad n^2 & \quad n! & \quad (3/2)^n \\
n^3 & \quad \lg^2 n & \quad \lg(n!) & \quad 2^n & \quad \ln \ln n \\
1 & \quad \ln n & \quad e^n & \quad \sqrt{\lg n} \\
n & \quad 2^n & \quad n \lg n
\end{align*}
\]

Note: This assignment should be done individually. You can either deliver it on iLearn or hand it out at the beginning of the class. You can either handwrite it or type it on your favorite word processor. As an acknowledgment for your typing effort, you will get an extra 10% for typing it without exceeding 100% of the final grade.