practice1-solution
cmpt 225 (Spring 2021)

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1. Sort the functions from lowest asymptotic order to highest asymptotic order. Note: some of them may have the same asymptotic order.
   - $f_1(n) = n + n^3$
   - $f_2(n) = nlog(n)$
   - $f_3(n) = log(n)^2$
   - $f_4(n) = 1.5^n$
   - $f_5(n) = n^{1.5}$
   - $f_6(n) = n^{log(n)}$
   - $f_7(n) = 2^n$
   - $f_8(n) = 2^{n-1}$
   - $f_9(n) = n!$
   - $f_{10}(n) = nlog(n)^2$

2. find an asymptotic order of a function $k(n)$ such that $k(n)^{k(n)} = n$.

3. find an asymptotic order of a function $k(n)$ such that $k(n)^{k(n)} = n^2$.

4. find an asymptotic order of a function $k(n)$ such that $k(n)^{k(n)} = 2^n$.

5. Let $f(n) = 2^n$ and $g(n) = 3^n$. It is true that $f = \Theta(g)$?

6. Suppose that $f = O(g)$ and $g = O(h)$. Prove formally that $f = O(h)$.

7. Suppose that $f = \Omega(g)$ and $g = \Omega(h)$. Prove formally that $f = \Omega(h)$.

8. Suppose that $f = \Theta(g)$ and $f = \Theta(h)$. Does this imply that $g = \Theta(h)$?

9. It is possible that $f = O(g)$, $g = \Omega(h)$ and $f = \Theta(h)$?

10. It is possible that $f = O(g)$, $g = \Theta(h)$ and $f = O(h)$?

11. It is possible that $f = O(g)$, $g = \Omega(h)$ and $f = \Omega(h)$?