Homework 1

1. In each of the following situations, indicate wherether $f = O(g)$, or $f = \Omega(g)$, or both (in which case $f = \Theta(g)$)

	$f(n)$	$g(n)$	O, Ω, or Θ?
(a)	$n - 100$	$n - 200$	$f = \Theta(g)$
(b)	$n^{1/2}$	$n^{2/3}$	$f = O(g)$
(c)	$100n + \log n$	$n + (\log n)^2$	$f = \Theta(g)$
(d)	$n \log n$	$10n \log 10n$	$f = \Theta(g)$
(e)	$\log 2n$	$\log 3n$	$f = \Theta(g)$
(f)	$10 \log n$	$\log(n^2)$	$f = \Theta(g)$
(g)	$n^{1.01}$	$n \log^2 n$	$f = \Omega(g)$
(h)	$n^2 / \log n$	$n(\log n)^2$	$f = \Omega(g)$
(i)	$n^{0.1}$	$(\log n)^{10}$	$f = \Omega(g)$
(j)	$(\log n)^{\log n}$	$n / \log n$	$f = \Omega(g)$
(k)	$\sqrt{(n)}$	$(\log n)^3$	$f = O(g)$
(l)	$n^{1/2}$	$5^{\log_2 n}$	$f = O(g)$
(m)	$n2^n$	$3n$	$f = \Omega(g)$
(n)	2^n	2^{n+1}	$f = \Theta(g)$
(o)	$n!$	2^n	$f = \Omega(g)$
(p)	$(\log n)^{\log n}$	$2^{(\log_2 n)^2}$	$f = O(g)$
(q)	$\sum_{i=1}^{n} i^k$	n^{k+1}	$f = O(g)$

2. Is the difference of $5^{30,000}$ and $6^{123,456}$ a multiple of 31?