Big oh notation proof.

① function $2^{n+10} = O(2^n)$.

we need to find n_0 & c for 2^n such that $2^{n+10} \leq c2^n$ for $n > n_0$

$2^{n+10} = 2^{10} * 2^n = 1024 \; 2^n$.

∴ when $c = 1024$, and $n_0 = 1$

$2^{n+10} \leq 10^{24} \; 2^n$ for $n > n_0$ $n_0 = 1$ $c = 1024$.

② 2^{10n} is not $O(2^n)$.

proof by contradiction

for c, $n_0 > 0$

find a case where

$2^{10n} \leq c \cdot 2^n$ $\forall n \geq n_0$ is not true

$2^{9n} \leq c$

when $n_0 = 1$

for large value of n
whatever value of c is

$2^{9n} > c$

∴ $2^{10n} \leq c \cdot 2^n$

is false

∴ 2^{10n} is not $O(2^n)$.