3) $2^{(-1)^n n}$ $= \smile$

n even $|2^{(-1)^n n}| = |2^1{}^n| = 2^n$

as n even $\to \infty$, $2^n \to \infty$

$\therefore$ sup $= \infty$ (or no finite sup.)

n odd, $|2^{(-1)^n n}| = |2^{-n}| = \left|\frac{1}{2^n}\right|$

as n odd $\to \infty$ $\frac{1}{2^n} \to 0$

$\therefore$ infimum $= 0$.

b) Suppose not, and suppose $M_2 > M_1$

Then $M_2 = M_1 + \varepsilon$, $\varepsilon > 0$

~~M_1 a~~ ~~M_2~~ a

M_1 a supremum $\Rightarrow x \leq M_1$ for all x

then $x < M_2 - \varepsilon$ for all x

and M_2 not a supremum

contradiction $\therefore M_1 = M_2$

c) $a_n = 1 - \frac{1}{n}$, $\sup a_n = 1$

$b_n = \frac{1}{n}$, $\sup b_n = 1$

$a_n + b_n = 1$ but $\sup a_n + \sup b_n = 2$

$\therefore \sup(a_n + b_n) = 1 \neq \sup a_n + b_n = 2$