Question 3) Numerically greatest term of $(a+b)^n$

$\therefore T_{r+1} = {}^nC_r a^{n-r} b^r = \frac{n!\, a^{n-r} b^r}{r!(n-r)!}$

$\therefore$ let T_r be the greatest term

$\therefore T_{r+1} > T_r$ and $T_{r+1} \geq T_{r+2}$

$\therefore \frac{n!\, a^{n-r} b^r}{r!(n-r)!} > \frac{n!\, a^{n-r+1} b^{r-1}}{(r-1)!(n-r+1)!}$ and $\frac{n!\, a^{n-r} b^r}{r!(n-r)!} \geq \frac{n!\, a^{n-r-1} b^{r+1}}{(r+1)!(n-r-1)!}$

$\therefore \frac{b}{r} > \frac{a}{n-r+1}$ and $\frac{a}{n-r} \geq \frac{b}{r+1}$

$\therefore ar < bn - br + b$ and $ar + a \geq bn - br$

$\therefore r < \frac{bn+b}{a+b}$ and $r \geq \frac{bn-a}{a+b}$

$\therefore \frac{bn}{a+b} - \frac{a}{a+b} \leq r < \frac{bn}{a+b} + \frac{b}{a+b}$

$\therefore r$ takes the integer value b/w $\frac{bn}{a+b} - \frac{a}{a+b}$ and $\frac{bn}{a+b} + \frac{b}{a+b}$

$\therefore T_r$ will be maximum.