eg (1) Find max & min value of
$x^3+3xy^2-3x^2-3y^2+4$

(2) If $u^3+v^3+w^3 = x+y+z$
$u^2+v^2+w^2 = x^3+y^3+z^3$
$u+v+w = x^2+y^2+z^2$
Show that
$$\frac{\partial(u,v,w)}{\partial(x,y,z)} = \frac{(x-y)(y-z)(z-x)}{(u-v)(v-w)(w-u)}$$

(3) Find point on the surface $z^2=xy+1$ nearest to the origin by using Lagranges method.

Q 2] Fill in the blanks

(1) The critical points of $x^2+y^2+6x+12$ are
- - -

(2) The focal length of mirror is found from the formula $\frac{1}{v}-\frac{1}{u}=\frac{2}{f}$. Find % error in f if u & v both have 2% error.

(3) If u, v & w are functionally dependent then find relat^n betⁿ them if
$u=\frac{x+y}{z}$ $v=\frac{y+z}{x}$ $w=\frac{y(x+y+z)}{xz}$

(4) Find $\frac{\partial(u,v)}{\partial(x,y)}$ if $x=u\cos v$
$y=u\sin v$