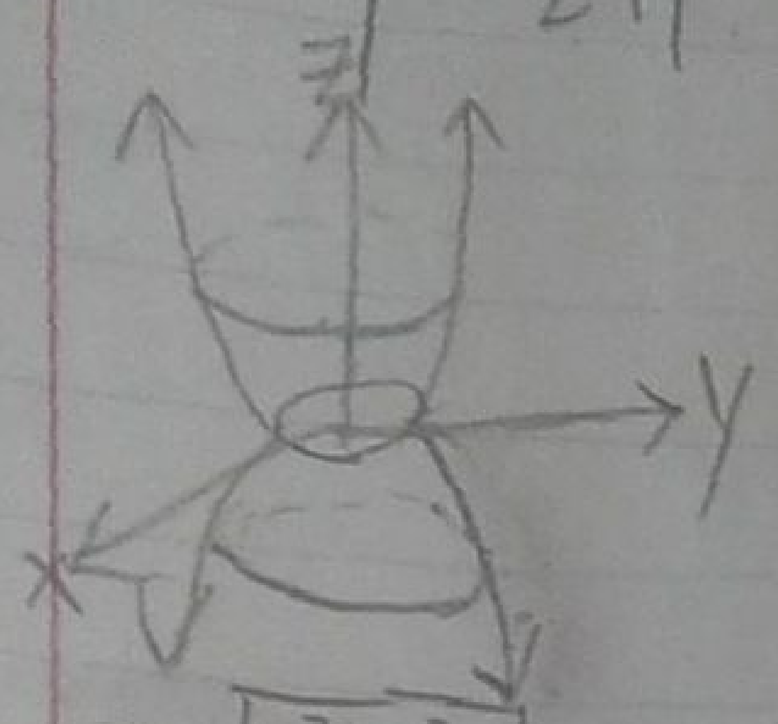
MATH 2605-G2 10/28/14

$\Rightarrow x^2+y^2=z^2+1$



$g=x^2+y^2-z^2-1$

$\nabla g=(2x, 2y, -2z)$

Tangent plane: $\nabla g(1,1,1)\cdot((x,y,z)-(1,1,1))=0$

$(2,2,-2)\cdot(x-1, y-1, z-1)=0$

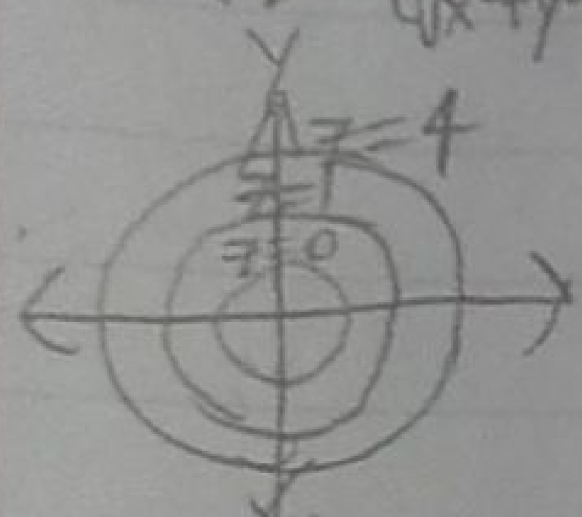
$2x+2y-2z=2$

Normal vector: $x=1+2t \quad y=1+2t \quad z=1-2t$

or $(x,y,z)=(1,1,1)+t(2,2,-2)$

$z=\sqrt{x^2+y^2-1}$

$\nabla f=\nabla z=\left(\frac{x}{\sqrt{x^2+y^2-1}}, \frac{y}{\sqrt{x^2+y^2-1}}\right)$



$\frac{\partial f}{\partial x}=0$ at $x=0 \quad \frac{\partial f}{\partial y}=0$ at $y=0$

$z=\sqrt{0+0-1}$ is not a real number.

Therefore, the surface has no points of local extrema.

Find the linearization of f at the specified point.

1) $f(x,y)=e^{2y-x}$ at $(0,0)$

$\frac{\partial f}{\partial x}=-e^{2y-x} \quad \frac{\partial f}{\partial y}=2e^{2y-x}$

$\frac{\partial f}{\partial x}(0,0)=-1 \quad \frac{\partial f}{\partial y}(0,0)=2 \quad f(0,0)=1$

$f(x,y)\approx f(0,0)+\frac{\partial f}{\partial x}(0,0)(x-0)+\frac{\partial f}{\partial y}(0,0)(y-0)=1-x+2y$