Solutions Quiz 6 6pm

1.- $P_1: 6x+6y+6z=6$ $\qquad P_2: 2x-9y+4z=-7$

the angle between P_1 and P_2 is given by the angle between their normal vector n_1 and n_2.

$n_1 = \langle 6,6,6\rangle$ $\qquad n_2 = \langle 2,-9,4\rangle$

$$\theta = \cos^{-1}\left(\frac{n_1\cdot n_2}{|n_1||n_2|}\right) = \cos^{-1}\left(\frac{\langle 6,6,6\rangle\cdot\langle 2,-9,4\rangle}{\sqrt{36+36+36}\sqrt{4+81+16}}\right) =$$

$$\cos^{-1}\left(\frac{12-54+24}{\sqrt{3(36)}\sqrt{101}}\right) = \cos^{-1}\left(\frac{-18}{6\sqrt{3}\sqrt{101}}\right) = \cos^{-1}\left(\frac{-3}{\sqrt{303}}\right)$$

2.- $$f(x,y) = \frac{1}{\sqrt{6-x^2-y^2}}$$

since division by zero and square root of a negative number are undefined, then the domain of f consists of all points (x,y) where $6-x^2-y^2$ is non-zero and non-negative, in other words all points (x,y) where $6-x^2-y^2>0$, which is the same as $6>x^2+y^2$.

Domain$(f) = \{(x,y) : x^2+y^2<6\}$

[points in the plane which are inside the circle centered at zero and radius $\sqrt{6}$]

Solving $a = \frac{1}{\sqrt{6-x^2-y^2}}$ we get $6-\frac{1}{a^2} = x^2+y^2$ which makes sense iff $6-\frac{1}{a^2}\geq 0$, Then Range f: $a \geq \frac{1}{\sqrt{6}}$

3.- level curve $1 = \frac{1}{\sqrt{6-x^2-y^2}}$

equivalent to $\sqrt{6-x^2-y^2}=1$

$6-x^2-y^2=1$

$5=x^2+y^2$

then $f(x,y)=1$ is a circle centered at the origin and radius $\sqrt{5}$