Brayan. Maldonado Carrasco.

1) Sea $f(x,y)\begin{cases}\dfrac{x^2+y^2}{x^2+y^4} & (x,y)\neq(0,0)\\ 1 & (x,y)=(0,0)\end{cases}$

Luego: $f(0,0)=1$.

$(x,y)\rightarrow(r,\theta)\longrightarrow x=r\cos\theta \wedge y\, r\sin\theta$

$$f(r,\theta)=\frac{(r\cos\theta)^2+r(\sin\theta)^2}{(r\cos\theta)^2+(r^2\sin^2\theta)^2}=\frac{\cancel{r^2}\overbrace{(\cos^2\theta+\sin^2\theta)}^{1}}{\cancel{r^2}(\cos^2\theta+r^2\operatorname{sen}^4\theta)}$$

$$f(r,\theta)=\frac{1}{\cos^2\theta+r^2\operatorname{sen}^4\theta}\Rightarrow\lim_{r\to0}f(r,\theta)=\lim_{r\to0}\frac{1}{\cos^2\theta+0}$$

$$\Rightarrow\frac{1}{\cos^2\theta}\Rightarrow f(\theta)=\frac{1}{\cos^2\theta}\Rightarrow \text{Luego: }\lim_{\theta\to0}f(\theta)=\frac{1}{\cos^2(\theta)}\ldots$$

$$\therefore\Rightarrow=1\ \Big\}\ \lim\frac{x^2+y^2}{x^2+y^4}=1.$$

$$f(0,0)=1=\lim_{(x,y)}\frac{x^2+y^2}{x^2+y^4}=1.$$

$\therefore$ El límite existe y es continua en el punto $(0,0)$. //

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② $z^2-2x^2-2y^2=12$ /tg ; $P_0(1,-1,4)$; $\pi: x=1$

$z=\sqrt{2x^2+2y^2-12} \Rightarrow f(x,y)=z$.

$f(1,-1)=\sqrt{2(1)^2+2(-1)^2-12}=4$.

$f(x,y,z)=z^2-2x^2-2y^2-12$

$\frac{\partial f}{\partial x}=-4x\cdot 1=4$

$\frac{\partial f}{\partial y}=-4y(-1)=4$

$\frac{\partial f}{\partial z}=2z(4)=8$

Luego: $x=-4t+1$

a) $y=4t-1$

$z=8t+4$

b) $\pi_t=-4(x-1)+4(y+1)+8(z-4)=0$

$\pi_t=-4x+4+4y+4+8z-32=0$

$\pi_t=-4x+4y+8z-24=0$

$\pi_t=4(-x+y+2z-6)=0$

$\therefore$ $\boxed{\pi_T=-x+y+2z-6=0}$ //

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(3) Brayan Alexis Maldonado Carrasco.

$$g(x,t) = \tau^{-1/2} e^{-x^2/kt} \Rightarrow g(x,y) = y^{-1/2} e^{-x^2/ky}$$

ecu: $\frac{K}{4} \frac{\partial^2 g}{\partial x^2} = \frac{\partial g}{\partial y}$

$$\Rightarrow \frac{\partial g}{\partial x} \Rightarrow y^{-1/2} e^{-x^2/ky} \cdot \left(\frac{-2x}{ky}\right) \Rightarrow \boxed{\frac{-2x e^{-x^2/ky}}{k y^{3/2}}} = \frac{\partial g}{\partial x}$$

Luego $\frac{\partial^2 g}{\partial x^2}$: $-\frac{2e^{-x^2/ky} \cdot x}{Ky^{3/2}} \Rightarrow \frac{2}{Ky^{3/2}} \cdot \underset{u}{\underset{\downarrow}{e^{-x^2/ky}}} \cdot \underset{v}{\underset{\downarrow}{x}}$

$$\Rightarrow -\frac{2}{Ky^{3/2}}\left[e^{-x^2/ky} \cdot \frac{-2x}{ky} \cdot x + 1 \cdot e^{-x^2/ky}\right]$$

$$\Rightarrow -\frac{2}{ky^{3/2}}\left[e^{-x^2/ky}\left(\frac{-2x^2}{ky} + 1\right)\right] \Rightarrow \frac{-2}{ky^{3/2}}\left[e^{-x^2/ky}\left(\frac{-2x^2 + ky}{ky}\right)\right]$$

$$\Rightarrow \frac{-2(-2x^2 + ky)}{k^2 y^{5/2} e^{x^2/ky}} \Rightarrow \boxed{\frac{4x^2 - 2ky}{k^2 y^{5/2} e^{x^2/ky}}} \Rightarrow \frac{\partial^2 g}{\partial x^2}$$

3.1) BRAYAN ALEXIS MALDONADO CARRASCO

Luego: $\frac{dg}{dy} \Rightarrow \underbrace{y^{-1/2}}_{u} \cdot \underbrace{e^{-x^2/ky}}_{v} \Rightarrow -\frac{1}{2} y^{-3/2} \cdot e^{-x^2/ky} + e^{-x^2/ky} \cdot \frac{x^2}{ky^2} \cdot y^{-1/2}$

$$\Rightarrow -\frac{1}{2}\left[y^{-3/2} e^{-x^2/ky}\right] + \frac{e^{-x^2/ky} \cdot x^2}{ky^{5/2}} \Rightarrow \underbrace{e^{-x^2/ky}\left[-\frac{1}{2} y^{-3/2} + \frac{x^2}{ky^{5/2}}\right]}_{\frac{dg}{dy}}$$

Luego Ecu:

$$\frac{K}{4}\left[\frac{4x^2 - 2ky}{k^2 y^{5/2} e^{x^2/ky}}\right] = e^{-x^2/ky}\left[-\frac{1}{2} y^{-3/2} + \frac{x^2}{ky^{5/2}}\right]$$

$$\frac{4x^2 - 2ky}{4ky^{5/2}} \cdot e^{-x^2/ky} = e^{-x^2/ky}\left[\frac{2x^2 - ky}{2ky^{5/2}}\right]$$

$$\frac{\cancel{2}(2x^2 - ky)e^{-x^2/ky}}{\cancel{2}(2ky^{5/2})} = e^{-x^2/ky}\left[\frac{2x^2 - ky}{2ky^{5/2}}\right]$$

$$e^{-x^2/ky}\left(\frac{2x^2 - ky}{2ky^{5/2}}\right) = e^{-x^2/ky}\left[\frac{2x^2 - ky}{2ky^{5/2}}\right]$$

BRAYAN MALDONADO CARRASCO.

(4)

$$r(t) = \begin{cases} x = 3/2 \cos t \\ y = 3 \sin t \end{cases} \quad P\left(3/2, \ 3/\sqrt{2}\right)$$

$$\vec{v} \begin{cases} x' = -3/2 \sin t & 3/2 = 3/2 \cos t \\ y' = 3 \cos t & 3/\sqrt{2} = 3 \sin t \end{cases}$$

1) $\frac{\sqrt{2}}{2} = \cos t \rightarrow \cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45$

2) $\frac{1}{\sqrt{2}} = \sin t \rightarrow \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) = 45$

$$\vec{v} \begin{cases} x' \quad t = 45 \Rightarrow \frac{-5}{2} \sin(45) = -3/2 \\ y' \quad t\ 45 \Rightarrow 3 \cos(45) = \frac{3\sqrt{2}}{2} \end{cases}$$

Luego: