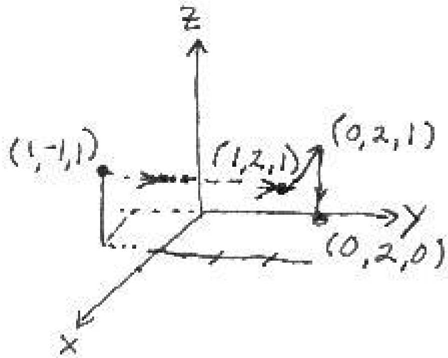
(1)



You will end up at $\boxed{(0,2,0)}$.

---

(2) $z = mx + ny + c \quad c = -3,\ m = 4,\ n = -5.$

$\boxed{\therefore\ z = 4x - 5y - 3}$

---

(3) Assuming the plane is not vertical, its equation is $z = mx + ny + c$. (The general equation can be $ax + by + cz = 1$.)

Plugging in gives:

$(0,0,1)$: $1 = m\cdot 0 + n\cdot 0 + c$, i.e. $\boxed{c = 1}$.

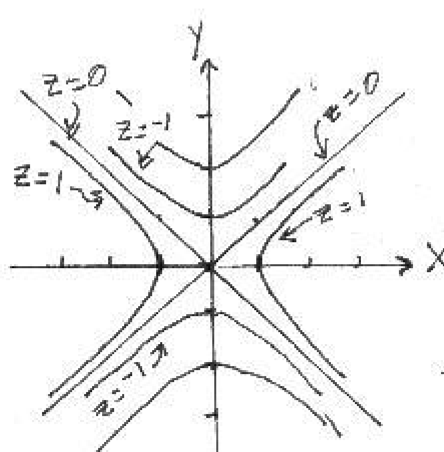
$(1,0,2)$: $2 = m + 1 \Rightarrow m = 1.$

$(1,1,3)$: $3 = 1 + 1 + n \Rightarrow n = 1.$

$\boxed{\therefore\ z = x + y + 1}$.

---

(4)



$z = 0$: $x^2 - y^2 = 0$

$z = 1$: $x^2 = y^2 + 1$

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

For ~~the~~ $z = 0$, the contour is a set of intersecting lines.

For all other values of z, the contours are hyperbolas.

5. $f(x,y) = \frac{x^2-y^2}{x+y} = x-y$ for $x+y \neq 0$. Therefore, the function has a limit of $0 = 0+0$ at $(0,0)$, provided we exclude the line $y=-x$ from its domain.

6. If ~~y=~~ $y=2x$: $f(x,2x) = \frac{x^2+4x^2}{x^2-4x^2} = \frac{5x^2}{-3x^2} = \frac{-5}{3}$.
If $2y=x$: $f(2y,y) = \frac{4y^2+y^2}{4y^2-y^2} = \frac{5}{3} \neq \frac{-5}{3}$.
Therefore, f cannot have a limit at $(0,0)$.

7. The function can be any function of y^2+z^2. For example, $f(x,y,z) = (y^2+z^2)^2$ would do.