$$v(z) = \sum a_{ij} \; z_i \frac{\partial}{\partial z_j} + [2],$$

then the Jacobian of $f_t(z)$ at p is given by

$$B_p = e^{t \cdot A_p},$$

where $A_p = (a_{ij})$.

$\ulcorner$ For simplicity, $n = 1$.

$$\begin{aligned} v(z) = v(x, y) &= a z \frac{\partial}{\partial z} + [2] \\ &= a(x + \sqrt{-1}\, y) \frac{\partial}{\partial z} + [2] \\ &= a x \frac{\partial}{\partial x} + a y \frac{\partial}{\partial y} + [2] \end{aligned}$$

as the corresponding real vector field.

$\Rightarrow$ We claim $f(t, x, y) = (f_1(t, x, y), \; f_2(t, x, y))$, where

$$\begin{aligned} f_1(t, x, y) &= x e^{at} + [2] \\ f_2(t, x, y) &= y e^{at} + [2], \end{aligned}$$

is a solution.

$$f_1(t, x, y) - x e^{at} \overset{?}{=} [2].$$

$$f_1(0, x, y) = x$$

at $t = 0$. by the assumption $f(t, x, y) = (x, y)$.

$\Rightarrow$ By the well-known fact (see P107 Spivak 2. lemma),

$$f_1(t, x, y) = x e^{at} + t \, g_1(t, x, y).$$

If $\dfrac{\partial g_1}{\partial x} \neq 0$ at $x = 0, y = 0$, then

we get the following