73. $\phi'(x) = -\frac{2xy+12y^3x^3}{x^2+9y^2x^4}$

74. $\dfrac{\partial \phi}{\partial y}(y,z) = -\dfrac{2x^2y}{2xy^2+e^x}$ e $\dfrac{\partial \phi}{\partial z}(y,z) = -\dfrac{1}{2xy^2+e^x}$

75. a. ϕ deverá ser de classe $\mathcal{C}^1$ numa vizinhança de $\frac{y_0}{z_0}$ e $\phi'(\frac{y_0}{z_0}) \neq \frac{x_0}{y_0}$

76. b. $z'_{\vec{u}}(1, \frac{\pi}{2}) = -\frac{2\pi+4}{\pi+4}$

77.

a. $\dfrac{\partial^2 \phi}{\partial x^2}(0,0) = 0$

b. $\phi(x,z) = \arcsin(-x) - z$ e $\dfrac{\partial^2 \phi}{\partial x^2}(0,0) = 0$

78. $y'(x) = -\frac{5x}{y}$ e $z'(x) = -\frac{4x}{z}$

79.

$$y'(x) = \frac{(-e^x\cos(yz) - 2x)(\cos(xyz)xy + 2z) - e^x\sin(yz)y(\cos(xyz)yz + 2x)}{-e^x\sin(yz)z(\cos(xyz)xy + 2z) + e^x\sin(yz)\cos(xyz)xyz} =$$

$$= \frac{(-e^x\cos(yz) - 2x)(\cos(xyz)xy + 2z) - e^x\sin(yz)y(\cos(xyz)yz + 2x)}{-e^x\sin(yz)2z^2}$$

e

$$z'(x) = \frac{e^x\sin(yz)z(\cos(xyz)yz + 2x) + \cos(xyz)xz(e^x\cos(yz) + 2x)}{-e^x\sin(yz)z(\cos(xyz)xy + 2z) + e^x\sin(yz)\cos(xyz)xyz} =$$

$$= \frac{e^x\sin(yz)z(\cos(xyz)yz + 2x) + \cos(xyz)xz(e^x\cos(yz) + 2x)}{-e^x\sin(yz)2z^2}$$

81. b. $Jac\, f^{-1}(u,v) = -\frac{1}{2e^{x+y}}\begin{bmatrix} -e^y & -e^y \\ -e^x & e^x \end{bmatrix}$, com $f(x,y) = (u,v)$

82. f é invertível numa vizinhança de $(\frac{1}{2}, \frac{1}{2})$