12. $f(x,y,z) = 2x^2 z - 4xy^2 z^3 - 5y^3 z^2 \quad (1,0,3)$

$f_x(x,y,z) = 2z \cdot 2x - 4y^2 z^3$

$\qquad = 4xz - 4y^2 z^3$

$f_x(1,0,3) = 4(1)(3) - 4(0)^2(3)^3$

$\qquad = \boxed{12}$

$f_y(x,y,z) = -4xz^3 \cdot 2y - 5z^2 \cdot 3y^2$

$\qquad = -8xyz^3 - 15y^2 z^2$

$f_y(1,0,3) = -8(1)(0)(3)^3 - 15(0)^2(3)^2$

$\qquad = \boxed{0}$

$f_z(x,y,z) = 2x^2 - 12xy^2 z^2 - 10y^3 z$

$f_z(1,0,3) = 2(1)^2 - 12(1)(0)^2(3)^2 - 10(0)^3(3)$

$\qquad = \boxed{2}$

13. $f(x,y,z) = x^2 \tan(z-y) \quad (2,0,\frac{\pi}{4})$

$f_x(x,y,z) = 2x \tan(z-y)$

$f_x(2,0,\frac{\pi}{4}) = 2(2)\tan(\frac{\pi}{4}-0)$

$\qquad = 4\tan\frac{\pi}{4}$

$\qquad = 4(1)$

$\qquad = \boxed{4}$

$f_y(x,y,z) = x^2 \sec^2(z-y) \cdot (-1)$

$\qquad = -x^2 \sec^2(z-y)$

$f_y(2,0,\frac{\pi}{4}) = -2^2 \sec^2(\frac{\pi}{4}-0)$

$\qquad = -4\sec^2\frac{\pi}{4}$

$\qquad = -4\left(\frac{1}{\frac{\sqrt{2}}{2}}\right)^2$

$\qquad = -4\left(\frac{2}{\sqrt{2}}\right)^2$

$\qquad = -4\left(\frac{4}{2}\right)$

$\qquad = \boxed{-8}$

$\frac{\pi}{4}(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

"$\frac{y}{x}$"

"$\frac{1}{x}$"
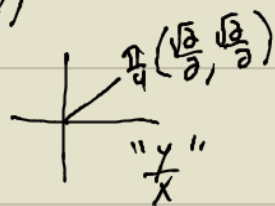
$f_z(x,y,z) = x^2 \sec^2(z-y) \cdot 1$

$\qquad = x^2 \sec^2(z-y)$

$f_z(2,0,\frac{\pi}{4}) = 2^2 \sec^2(\frac{\pi}{4}-0)$

$\qquad = 4(2)$

$\qquad = \boxed{8}$