Q1) $z = (x+a)(y+b)$

$z = xy + ax + xb + yb + ab$

$p = \dfrac{\partial z}{\partial x} = y + b$

$q = \dfrac{\partial z}{\partial y} = x + a$

so $p \times q = z$

Q2) $2(x-b) \times (1) + 0 + 2z \dfrac{\partial z}{\partial x} = 0$

$2(x-b) = -2z \dfrac{\partial z}{\partial x}$

$x - b = -z \dfrac{\partial z}{\partial x}$

$2(y-k) \times 1 + 2z \dfrac{\partial z}{\partial y} = 0$

$2(y-k) = -2z \dfrac{\partial z}{\partial y}$

$y - k = -z \dfrac{\partial z}{\partial y}$ $\Rightarrow$ putting in the above equation

$z^2 p^2 + z^2 q^2 + z^2 = a^2$

$z^2 (p^2 + q^2 + 1) = a^2$

Q3) $\left(2 \dfrac{\partial z}{\partial x} = 2(ax + y) a \right) \cdot xx$ 　⊡˙

$\left(2 \dfrac{\partial z}{\partial y} = 2 (ax + y) 1 \right) \times y$ 　　$2px + 2qu = 2(ax+y)^2$

$px + qy = (ax+y)^2$

$\left(2z = px + qy + b \right)$

Good Write

4) $a^2 x^2 + b y^2 + z^2 = 1$

$$2ax + 0 + 2z\frac{dz}{dx} = 0$$

$$2ax = -2z\frac{\partial z}{\partial x}$$

$$\frac{-ax}{2} = z\frac{\partial z}{\partial x}$$

$$-by = z\frac{\partial z}{\partial y}$$

$$zpx = -ax^2 \qquad zqx = -ay^2$$

$$-(zpx + zqy) + z^2 = 1$$

$$\boxed{z(px + qy) = z^2 - 1}$$

6) $z = f(x^2 + y^2)$

$$\frac{\partial z}{\partial x} = f(x^2 + y^2) \times 2x$$

$$\frac{\partial z}{\partial y} = f(x^2 + y^2) \times 2y$$

$$\frac{p}{q} = \frac{x}{y}$$

$$\boxed{py - qx = 0}$$

7) $\quad 2z = \dfrac{x^2}{a^2} + \dfrac{y^2}{b^2}$

$\left(2 \dfrac{\partial z}{\partial x} = \dfrac{2x}{a^2} \right) \times x$

$\left(2 \dfrac{\partial z}{\partial y} = \dfrac{2y}{b^2} \right) \times y$

$$\boxed{2z = xp + yq}$$