Assignment

I. Solve the following PDEs

1. $xp - yq = y^2 - x^2$
2. $\left(x^2 - yz\right)p + \left(y^2 - zx\right)q = z^2 - xy$
3. $x^2\left(y^3 - z^3\right)p + y^2\left(z^3 - x^3\right)q = z^2\left(x^3 - y^3\right)$
4. $\left(x^3 + 3xy^2\right)p + \left(y^3 + 3x^2y\right)q = 2\left(x^2 + y^2\right)z$

Answers:

1. $\phi\left(xy,\ x^2 + y^2 + 2z\right) = 0$
2. $\phi\left(\frac{x-y}{y-z}, \frac{y-z}{z-x}\right) = 0$
3. $\phi\left(x^2 + y^2 + z^2, \frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right) = 0$
4. $\phi\left((x-y)^{-2} - (x+y)^{-2}, \frac{xy}{z^2}\right) = 0$