Answer on Question #82198 – Math – Differential Equations

Question

$$(y+z)p-(z+x)q=x-y$$

Solution

Compare with $Pp+Qq=R$

$$P=y+z, Q=-(z+x), R=x-y$$

Consider Lagrange's auxiliary equations

$$\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$$

$$\frac{dx}{y+z}=\frac{dy}{-(z+x)}=\frac{dz}{x-y}=\frac{dx+dy+dz}{y+z-z-x+x-y}=\frac{dx+dy+dz}{0}$$

$dx+dy+dz=0 => x+y+z=c_1$

$$\frac{dx}{y+z}=\frac{dy}{-(z+x)}=\frac{dz}{x-y}=\frac{xdx+ydy-zdz}{xy+xz-yz-xy-xz+yz}=\frac{xdx+ydy-zdz}{0}$$

$d(x^2+y^2-z^2)=0 => x^2+y^2-z^2=c_2$

General solution is

$$F(x+y+z, x^2+y^2-z^2)=0$$

Answer: $F(x+y+z, x^2+y^2-z^2)=0.$