Lorenz attractor

$$\frac{dx}{dt} = \sigma(y - x) \qquad \sigma = 10$$

$$\beta = 8/3$$

$$\frac{dy}{dt} = x(\rho - z) - y \qquad \rho = 28$$

$$\frac{dz}{dt} = xy - \beta z$$

$$x, y, z = 0$$

$$\sigma(y - x) = 0 \qquad y - x = 0$$

$$y = x$$

$$x(\rho - z) - y = 0 \qquad xy - \beta z = 0$$

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

$$x(\rho - z) = x \qquad x = \sqrt{\beta z}$$

$$x = \sqrt{\tfrac{8}{3}\,27}$$

$$\rho - z = 1 \qquad = \sqrt{72} \approx \pm 8.5$$

$$z = \rho - 1 = 28 - 1 = 27$$

$$x_0 = 10 \qquad y_0 = 10 \qquad z_0 = 10$$