```
Clear["Global`*"]
σ = 10; b = 8 / 3; r = 28;
f[x_, y_, z_] := σ * (y - x);
g[x_, y_, z_] := r * x - y - x * z;
h[x_, y_, z_] := x * y - b * z;
s = Solve[f[x, y, z] == 0 && g[x, y, z] == 0 && h[x, y, z] == 0, {x, y, z}]
J[x_, y_, z_] := {{D[f[x, y, z], x], D[f[x, y, z], y], D[f[x, y, z], z]},
  {D[g[x, y, z], x], D[g[x, y, z], y], D[g[x, y, z], z]},
  {D[h[x, y, z], x], D[h[x, y, z], x], D[h[x, y, z], z]}};
Eigenvalues[J[x, y, z] /. s[[1]]](*(1) Has eigenvalues larger than one → unstable*)
Eigenvalues[J[x, y, z] /. s[[2]]]
(*(2) and (3) have imaginary eigenvalues → unstable*)
Eigenvalues[J[x, y, z] /. s[[3]]]
```

Out[•]= $\left\{\{x \to 0, y \to 0, z \to 0\}, \left\{x \to -6\sqrt{2}, y \to -6\sqrt{2}, z \to 27\right\}, \left\{x \to 6\sqrt{2}, y \to 6\sqrt{2}, z \to 27\right\}\right\}$

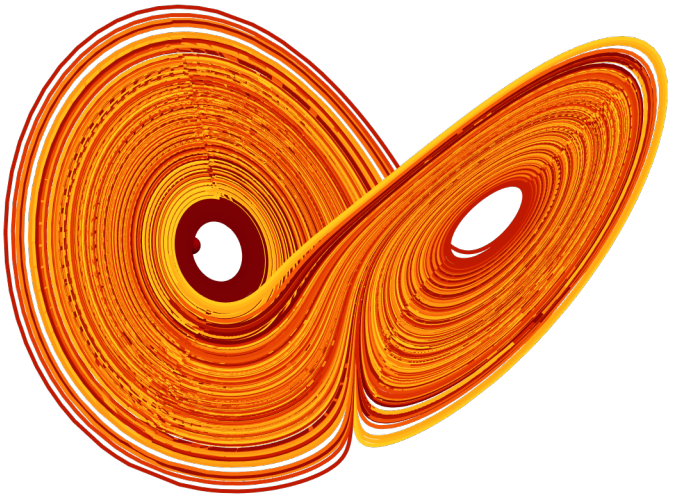
Out[•]= $\left\{\frac{1}{2} \times \left(-11 - \sqrt{1201}\right), \frac{1}{2} \times \left(-11 + \sqrt{1201}\right), -\frac{8}{3}\right\}$

Out[•]= $\left\{\frac{1}{3}\ \text{Root}\left[-41.6\ldots\right], \frac{1}{3}\ \text{Root}\left[0.282\ldots + 30.6\ldots\, i\right], \frac{1}{3}\ \text{Root}\left[0.282\ldots - 30.6\ldots\, i\right]\right\}$

Out[•]= $\left\{\frac{1}{3}\ \text{Root}\left[-41.6\ldots\right], \frac{1}{3}\ \text{Root}\left[0.282\ldots + 30.6\ldots\, i\right], \frac{1}{3}\ \text{Root}\left[0.282\ldots - 30.6\ldots\, i\right]\right\}$

```
Clear["Global`*"]
σ = 10; b = 8 / 3; r = 28;
(*Plotting code courtesy of Wolfram Mathematica guides at: https://
 reference.wolfram.com/language/example/VisualizeTheLorenzAttractor.html*)
s = NDSolve[{x'[t] == σ * (y[t] - x[t]), y'[t] == r * x[t] - y[t] - x[t] * z[t],
     z'[t] == x[t] * y[t] - b * z[t], x[0] == y[0] == z[0] == 0.01},
    {x, y, z}, {t, 0, 400}, MaxSteps → 1000000];
Show[ParametricPlot3D[Evaluate[{x[t], y[t], z[t]} /. s], {t, 5, 400},
  PlotPoints → 1000, PlotStyle → Directive[Thick, RGBColor[.8, 0, 0]],
  ColorFunction → (ColorData["SolarColors", #4] &)],
 Graphics3D[{ColorData["SolarColors"][0],
   Sphere[First[({x[t], y[t], z[t]} /. s) /. t → 5], .75]}], RotationAction → "Clip",
 Boxed → False, SphericalRegion → False, Axes → False, ImageSize → 500]
```

Out[•]=



In[]:=
```
Clear["Global`*"]
f[x_, y_, z_] := σ * (y - x);
g[x_, y_, z_] := r * x - y - x * z;
h[x_, y_, z_] := x * y - b * z;
J[x_, y_, z_] := {{D[f[x, y, z], x], D[f[x, y, z], y], D[f[x, y, z], z]},
   {D[g[x, y, z], x], D[g[x, y, z], y], D[g[x, y, z], z]},
   {D[h[x, y, z], x], D[h[x, y, z], x], D[h[x, y, z], z]}};
J[x, y, z]
Tr[J[x, y, z]]
```

Out[]=
$$\{\{-\sigma, \sigma, 0\}, \{r - z, -1, -x\}, \{y, y, -b\}\}$$

Out[]=
$$-1 - b - \sigma$$