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In[1702]:= Remove[x, y, z, sigma, r, b, s, t]
r = 28;
b = 8 / 3;
sigma = 10;
s = NDSolve[{x'[t] == sigma * (y[t] - x[t]), y'[t] == r * x[t] - y[t] - x[t] * z[t],
  z'[t] == x[t] * y[t] - b * z[t], z[0] == x[0] == y[0] == 0.0001},
  {x, y, z}, {t, 0, 100}, Method -> "ExplicitRungeKutta"];

x'[t] = sigma * (y - x);
y'[t] = r * x - y - x * z;
z'[t] = x * y - b * z;

J = {{D[x'[t], x], D[x'[t], y], D[x'[t], z]},
  {D[y'[t], x], D[y'[t], y], D[y'[t], z]}, {D[z'[t], x], D[z'[t], y], D[z'[t], z]}};
lambda = {0, 0, 0};
dt = 0.001;
Q = IdentityMatrix[3]

nIterations = 1000;
For[timeStep = 0, timeStep < nIterations, timeStep++,
  t = timeStep * dt;
  x = x[t] /. s[[1]];
  y = y[t] /. s[[1]];
  z = z[t] /. s[[1]];
  M = IdentityMatrix[3] + J * dt;
  {Q, R} = QRDecomposition[M * ConjugateTranspose[Q]];
  For[i = 1, i < 4, i++, lambda[[i]] += Log[Abs[R[[i]][[i]]]]]
]
lambda = lambda / (nIterations * dt)
Total[lambda]

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Out[1713]= {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}

Out[1716]= {-10.0503, -1.0005, -2.67023}

Out[1717]= -13.7211