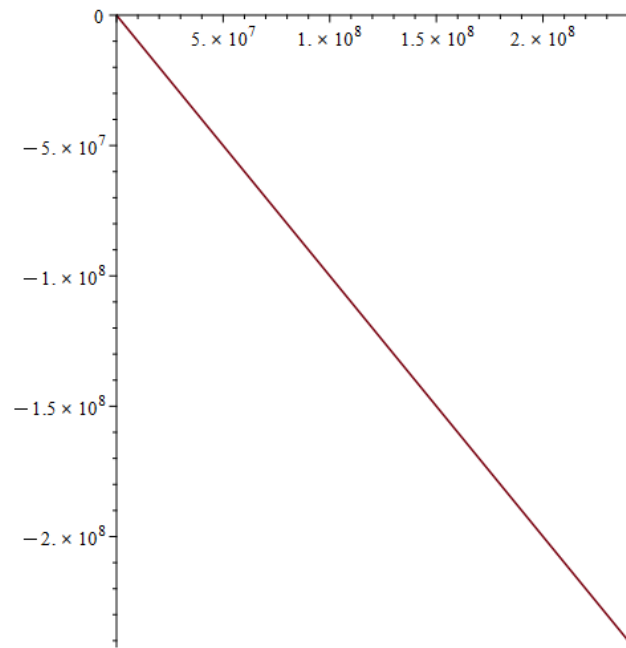


Prob 2

```
=
> S:= dsolve({diff(x(t), t)=x(t)-y(t), diff(y(t), t)=y(t)-x(t), x(0)=1, y(0)=0}, {x(t), y(t)});
```

$$S := \left\{ x(t) = \frac{1}{2} + \frac{e^{2t}}{2}, y(t) = -\frac{e^{2t}}{2} + \frac{1}{2} \right\}$$

```
=
> plot([subs(S, x(t)), subs(S, y(t)), t=0..10]);
```



```
=
> ]
```

Prob 3

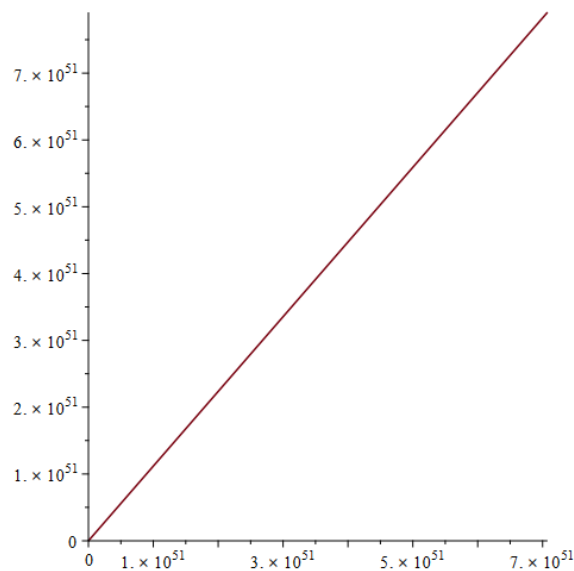
```
=
> a:= RandMat(2, 10);
```

```
A:= dsolve({diff(x(t), t)=a[1, 1]·x(t)+a[1, 2]·y(t), diff(y(t), t)=a[2, 1]·x(t)+a[2, 2]·y(t), x(0)=1, y(0)=1}, {x(t), y(t)});
```

$$a := \begin{bmatrix} 3 & 8 \\ 10 & 3 \end{bmatrix}$$

$$A := \left\{ x(t) = \left(\frac{1}{2} + \frac{\sqrt{5}}{5} \right) e^{(3+4\sqrt{5})t} + \left(\frac{1}{2} - \frac{\sqrt{5}}{5} \right) e^{(-3+4\sqrt{5})t}, y(t) = \frac{\sqrt{5}}{2} \left(\left(\frac{1}{2} + \frac{\sqrt{5}}{5} \right) e^{(3+4\sqrt{5})t} - \left(\frac{1}{2} - \frac{\sqrt{5}}{5} \right) e^{(-3+4\sqrt{5})t} \right) \right\}$$

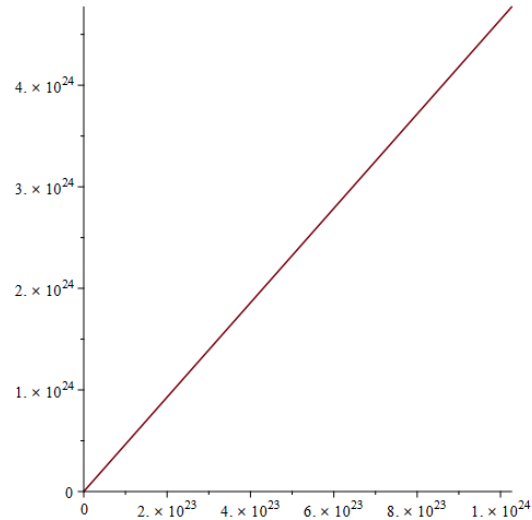
```
=
> plot([subs(A, x(t)), subs(A, y(t)), t=0..10]);
```



```

> a := RandMat(2, 10);
A := dsolve({diff(x(t), t) = a[1, 1] · x(t) + a[1, 2] · y(t), diff(y(t), t) = a[2, 1] · x(t) + a[2, 2] · y(t), x(0) = 1, y(0) = 1}, {x(t), y(t)});
a := [[1, 1], [3, 5]]
A := {x(t) = (1/2 - sqrt(7)/14) e^(3+sqrt(7)t) + (1/2 + sqrt(7)/14) e^(-3+sqrt(7)t), y(t) = (1/2 - sqrt(7)/14) e^(3+sqrt(7)t) sqrt(7) - (1/2 + sqrt(7)/14) e^(-3+sqrt(7)t) sqrt(7) + 2(1/2 - sqrt(7)/14) e^(3+sqrt(7)t) + 2(1/2 + sqrt(7)/14) e^(-3+sqrt(7)t)}
> plot([subs(A, x(t)), subs(A, y(t)), t = 0 .. 10]);

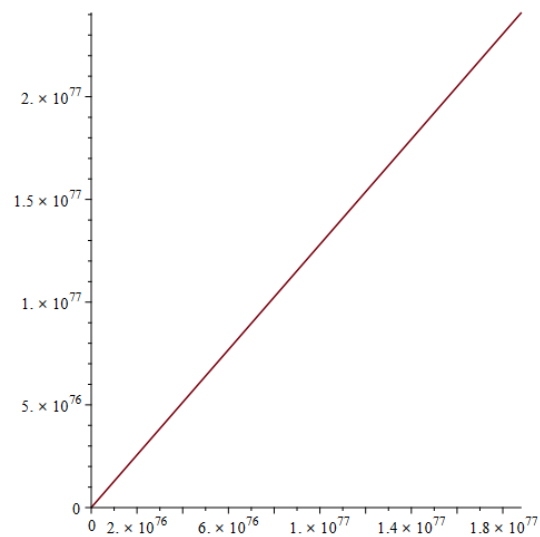
```



```

A := {x(t) = (1/2 + 3*sqrt(17)/34) e^(5(3+sqrt(17))/2 t) + (1/2 - 3*sqrt(17)/34) e^(-5(-3+sqrt(17))/2 t), y(t) = ((1/2 + 3*sqrt(17)/34) e^(5(3+sqrt(17))/2 t) sqrt(17) - (1/2 - 3*sqrt(17)/34) e^(-5(-3+sqrt(17))/2 t) sqrt(17) + ((1/2 + 3*sqrt(17)/34) e^(5(3+sqrt(17))/2 t) + (1/2 - 3*sqrt(17)/34) e^(-5(-3+sqrt(17))/2 t)))}
> plot([subs(A, x(t)), subs(A, y(t)), t = 0 .. 10]);

```



Prob 4
Lotka

```

> S := Dis(Lotika(1, 2, 3, 4, 2, 4, NI, N2), [NI, N2], [1, 1], 0.01, 0.5);
S := [[0.01, [1., 1.], [0.02, [0.9950000000, 0.9925000000]], [0.03, [0.9901245000, 0.9852609531]], [0.04, [0.9853687023, 0.9782723078]], [0.05, [0.9807280428, 0.9715240843]],
[0.06, [0.9761981766, 0.9650068366]], [0.07, [0.9717749648, 0.9587116178]], [0.08, [0.9674544620, 0.9526299481]], [0.09, [0.9632329050, 0.9467537851]], [0.10, [0.9591067019,
0.9410754962]], [0.11, [0.9550724224, 0.9355878335]], [0.12, [0.9511267886, 0.9302839099]], [0.13, [0.9472666662, 0.9251571776]], [0.14, [0.9434890566, 0.9202014077]], [0.15,
[0.9397910896, 0.9154106715]], [0.16, [0.9361700161, 0.9107793226]], [0.17, [0.9326232018, 0.9063019812]], [0.18, [0.9291481211, 0.9019735184]], [0.19, [0.9257423512,
0.8977890423]], [0.20, [0.9224035668, 0.8937438847]], [0.21, [0.9191295353, 0.8898335888]], [0.22, [0.9159181118, 0.8860538979]], [0.23, [0.9127672348, 0.8824007441]], [0.24,
[0.9096749222, 0.8788702388]], [0.25, [0.9066392669, 0.8754586628]], [0.26, [0.9036584338, 0.8721624576]], [0.27, [0.9007306557, 0.8689782174]], [0.28, [0.8978542305,
0.8659026808]], [0.29, [0.8950275179, 0.8629327238]], [0.30, [0.8922489364, 0.8600653528]], [0.31, [0.8895169610, 0.8572976984]], [0.32, [0.8868301201, 0.8546270090]], [0.33,
[0.8841869933, 0.8520506451]], [0.34, [0.8815862091, 0.8495660742]], [0.35, [0.8790264426, 0.8471708655]], [0.36, [0.8765064137, 0.8448626851]], [0.37, [0.8740248847,
0.8426392916]], [0.38, [0.8715806590, 0.8404985317]], [0.39, [0.8691725787, 0.8384383364]], [0.40, [0.8667995235, 0.8364567168]], [0.41, [0.8644604088, 0.8345517610]], [0.42,
[0.8621541843, 0.8327216303]], [0.43, [0.8598798326, 0.8309645562]], [0.44, [0.8576363677, 0.8292788373]], [0.45, [0.8554228338, 0.8276628363]], [0.46, [0.8532383041,
0.8261149774]], [0.47, [0.8510818797, 0.8246337438]], [0.48, [0.8489526883, 0.8232176749]], [0.49, [0.8468498833, 0.8218653644]], [0.50, [0.8447726426, 0.8205754576]], [0.51,
[0.8427201680, 0.8193466498]]]

```

1.

```

> S := Dis(Lotika(1, 2, 3, 4, 5, 6, NI, N2), [NI, N2], [1, 1], 0.01, 0.5);
S := [[0.01, [1., 1.], [0.02, [0.9800000000, 0.9775000000]], [0.03, [0.9610492500, 0.9565509531]], [0.04, [0.9430593498, 0.9370168928]], [0.05, [0.9259515751, 0.9187775803]],
[0.06, [0.9096555706, 0.9017263062]], [0.07, [0.8941082511, 0.8857680518]], [0.08, [0.8792528727, 0.8708179420]], [0.09, [0.8650382439, 0.8567999381]], [0.10, [0.8514180527,
0.8436457281]], [0.11, [0.8383502896, 0.8312937800]], [0.12, [0.8257967519, 0.8196885311]], [0.13, [0.8137226149, 0.8087796917]], [0.14, [0.8020960604, 0.7985216434]], [0.15,
[0.7908879539, 0.7888729187]], [0.16, [0.7800715624, 0.7797957487]], [0.17, [0.7696232076, 0.7712556686]], [0.18, [0.7595175490, 0.7632217133]], [0.19, [0.7497363931,
0.7556634149]], [0.20, [0.7402595247, 0.7485559370]], [0.21, [0.7310690576, 0.7418744404]], [0.22, [0.7221484021, 0.7355965758]], [0.23, [0.7134821473, 0.7297017605]], [0.24,
[0.7050559554, 0.7241710153]], [0.25, [0.6968564683, 0.7189868194]], [0.26, [0.6888712229, 0.7141329809]], [0.27, [0.6810885758, 0.7095945213]], [0.28, [0.6734976353,
0.7053575716]], [0.29, [0.6660881999, 0.7014092794]], [0.30, [0.6588507033, 0.6977377255]], [0.31, [0.6517761643, 0.6943318482]], [0.32, [0.6448561414, 0.6911813756]], [0.33,
[0.6380826917, 0.6882767642]], [0.34, [0.6314483338, 0.6856091433]], [0.35, [0.6249460134, 0.6831702646]], [0.36, [0.6185690726, 0.6809524565]], [0.37, [0.6123112216,
0.6789485825]], [0.38, [0.6061665128, 0.6771520035]], [0.39, [0.6001293170, 0.6755565432]], [0.40, [0.5941943020, 0.6741564568]], [0.41, [0.5883564125, 0.6729464019]], [0.42,
[0.5826108520, 0.6719214126]], [0.43, [0.5769530658, 0.6710768753]], [0.44, [0.5713787257, 0.6704085065]], [0.45, [0.5658837158, 0.6699123328]], [0.46, [0.5604641191,
0.6695846722]], [0.47, [0.5551162056, 0.6694221169]], [0.48, [0.5498364210, 0.6694215177]], [0.49, [0.5446213765, 0.6695799696]], [0.50, [0.5394678389, 0.6698947983]], [0.51,
[0.5343727221, 0.6703635480]]]

```

2.

```

> S := Dis(Lotika(1, 2, 8, 9, 10, 33, NI, N2), [NI, N2], [1, 1], 0.01, 0.5);
S := [[0.01, [1., 1.], [0.02, [0.9550000000, 0.9777777778]], [0.03, [0.9228509861, 0.6167412894]], [0.04, [0.8993632109, 0.4957548374]], [0.05, [0.8820197937, 0.4024366361]],
[0.06, [0.8692023431, 0.3290712217]], [0.07, [0.8598153291, 0.2705323807]], [0.08, [0.8530866760, 0.2232927661]], [0.09, [0.8484543542, 0.1848364859]], [0.10, [0.845498257,
0.1533176258]], [0.11, [0.8438974145, 0.1273493540]], [0.12, [0.8434020849, 0.1058686717]], [0.13, [0.8438149774, 0.08804684541]], [0.14, [0.8449782463, 0.0732284117]], [0.15,
[0.8467642668, 0.06088860388]], [0.16, [0.8490689461, 0.05060297109]], [0.17, [0.8518067746, 0.04202526003]], [0.18, [0.8549070984, 0.03487101095]], [0.19,
[0.8583112649, 0.02890518378]], [0.20, [0.8619704042, 0.02393267591]], [0.21, [0.8658436804, 0.01979094956]], [0.22, [0.8698968974, 0.01634422245]], [0.23, [0.8741013739,
0.01347883446]], [0.24, [0.8784330282, 0.01109951176]], [0.25, [0.8828716267, 0.009126325464]], [0.26, [0.8874001627, 0.007492194830]], [0.27, [0.8920043403,
0.006140822816]], [0.28, [0.8966721430, 0.005024978867]], [0.29, [0.9013934718, 0.004105063548]], [0.30, [0.9061598417, 0.003347904112]], [0.31, [0.9109641250,
0.002725740840]], [0.32, [0.9158003355, 0.002215372111]], [0.33, [0.9206634457, 0.001797432288]], [0.34, [0.9255492327, 0.001455781293]], [0.35, [0.9304541483,
0.001176988429]], [0.36, [0.9353752085, 0.0009498959515]], [0.37, [0.9403099012, 0.0007652502642]], [0.38, [0.9452561080, 0.0006153905092]], [0.39, [0.9502120384,
0.0004939859033]], [0.40, [0.9551761746, 0.0003958144764]], [0.41, [0.9601472251, 0.0003165769584]], [0.42, [0.9651240859, 0.0002527404810]], [0.43, [0.9701058080,
0.0002014075468]], [0.44, [0.9750915704, 0.0001602063782]], [0.45, [0.9800806575, 0.0001271993329]], [0.46, [0.9850724403, 0.0001008065580]], [0.47, [0.9900663611,
0.00007974247543]], [0.48, [0.9950619202, 0.00006296304981]], [0.49, [1.000058666, 0.00004962209947]], [0.50, [1.005056185, 0.00003903517576]], [0.51, [1.010054096,
0.00003064976313]]]

```

3.

Volterra:

```

> S := Dis(Volterra(1, 2, 3, 4, x, y), [x, y], [1, 1], 0.01, 1);
S := [[0.01, [1., 1.], [0.02, [0.99, 1.01]], [0.03, [0.979902, 1.019696]], [0.04, [0.9697169770, 1.029073206]], [0.05, [0.9594559516, 1.038117400]], [0.06, [0.9491299527,
1.046814995]], [0.07, [0.9387499829, 1.055153084]], [0.08, [0.9283269839, 1.063119489]], [0.09, [0.9178718035, 1.070702804]], [0.10, [0.9073951632, 1.077892437]], [0.11,
[0.8969076271, 1.084678639]], [0.12, [0.8864195725, 1.091052542]], [0.13, [0.8759411616, 1.097006179]], [0.14, [0.8654823159, 1.102532509]], [0.15, [0.8550526913,
1.107625430]], [0.16, [0.8446616561, 1.112279791]], [0.17, [0.8343182709, 1.116491401]], [0.18, [0.8240312701, 1.120257026]], [0.19, [0.8138090464, 1.123574388]], [0.20,
[0.8036596369, 1.126442156]], [0.21, [0.7935907114, 1.128859935]], [0.22, [0.7836095633, 1.130828247]], [0.23, [0.7737231023, 1.132348513]], [0.24, [0.7639378492,
1.13423026]], [0.25, [0.7542599327, 1.134054925]], [0.26, [0.7446950882, 1.134248165]], [0.27, [0.7352486584, 1.134007481]], [0.28, [0.7259255954, 1.133338356]], [0.29,
[0.7167304650, 1.132246978]], [0.30, [0.7076674515, 1.130740205]], [0.31, [0.6987403652, 1.128825521]], [0.32, [0.6899526498, 1.126510993]], [0.33, [0.6813073914,
1.123805233]], [0.34, [0.6728073291, 1.120717348]], [0.35, [0.6644548655, 1.117256902]], [0.36, [0.6562520785, 1.113433866]], [0.37, [0.6482007335, 1.109258582]], [0.38,
[0.6403022963, 1.104741714]], [0.39, [0.6325579462, 1.099894209]], [0.40, [0.6249685893, 1.094727256]], [0.41, [0.6175348722, 1.089252244]], [0.42, [0.6102571960,
1.083480727]], [0.43, [0.6031357298, 1.077424381]], [0.44, [0.5961704243, 1.071094976]], [0.45, [0.5893610256, 1.064504333]], [0.46, [0.5827070886, 1.057664298]], [0.47,
[0.5762079898, 1.050586708]], [0.48, [0.5698629406, 1.043283365]], [0.49, [0.5636709995, 1.035766005]], [0.50, [0.5576310843, 1.028046275]], [0.51, [0.5517419839,
1.020135709]], [0.52, [0.5460023697, 1.012045706]], [0.53, [0.5404108063, 1.003787509]], [0.54, [0.5349657621, 0.9953721884]], [0.55, [0.5296656189, 0.9868106244]], [0.56,
[0.5245086819, 0.9781134921]], [0.57, [0.5194931883, 0.9692912480]], [0.58, [0.5146173162, 0.9603541186]], [0.59, [0.5098791922, 0.9513120894]], [0.60, [0.5052768993,
0.9421748963]], [0.61, [0.5008084841, 0.9329520178]], [0.62, [0.4964719632, 0.9236526687]], [0.63, [0.4922653297, 0.9142857948]], [0.64, [0.4881865590, 0.9048600689]], [0.65,
[0.4842336141, 0.8953838877]], [0.66, [0.4804044507, 0.8858653701]], [0.67, [0.4766970219, 0.8763123557]], [0.68, [0.4731092823, 0.8667324046]], [0.69, [0.4696391922,
0.8571327983]], [0.70, [0.4662847210, 0.8475205406]], [0.71, [0.4630438506, 0.8379023596]], [0.72, [0.4599145784, 0.8282847102]], [0.73, [0.4568949199, 0.8186737774]], [0.74,
[0.4539829113, 0.8090754797]], [0.75, [0.4511766116, 0.7994954730]], [0.76, [0.4484741045, 0.7899391551]], [0.77, [0.4458735004, 0.7804116706]], [0.78, [0.4433729377,
0.7709179158]], [0.79, [0.4409705843, 0.7614625439]], [0.80, [0.4386646384, 0.7520499709]], [0.81, [0.4364533302, 0.7426848309]], [0.82, [0.4343349221, 0.7333697324]], [0.83,
[0.4323077096, 0.7241097638]], [0.84, [0.4303700220, 0.7149080002]], [0.85, [0.4285202228, 0.7057677591]], [0.86, [0.4267567099, 0.6966921566]], [0.87, [0.4250779159,
0.6876841140]], [0.88, [0.4234823085, 0.6787463638]], [0.89, [0.4219683901, 0.6698814560]], [0.90, [0.4205346980, 0.6610917643]], [0.91, [0.4191798045, 0.6523794924]], [0.92,
[0.4179023163, 0.6437466799]], [0.93, [0.4167008749, 0.6351952086]], [0.94, [0.4155741556, 0.6267268083]], [0.95, [0.4145208679, 0.6183430627]], [0.96, [0.4135397545,
0.6100454149]], [0.97, [0.4126295914, 0.6018351737]], [0.98, [0.4117891873, 0.5937135186]], [0.99, [0.4110173831, 0.5856815053]], [1.00, [0.4103130513, 0.5777400713]], [1.01,
[0.4096750960, 0.5698900409]]]

```

1.

2.

```
> S := Dis(Volterra(2, 5, 8, 9, x, y), [x, y], [1, 1], 0.01, 1);
S := [[0.01, [1., 1.]], [0.02, [0.97, 1.01]], [0.03, [0.940415, 1.017373]], [0.04, [0.9113856585, 1.022090915]], [0.05, [0.8830374216, 1.024160352]], [0.06, [0.8554795742, 1.023620996]], [0.07, [0.8288048230, 1.020543133]], [0.08, [0.8030893660, 1.015024479]], [0.09, [0.7783933850, 1.007186504]], [0.10, [0.7547618871, 0.9971704418]], [0.11, [0.7322258126, 0.9851331685]], [0.12, [0.7108033322, 0.9712431091]], [0.13, [0.6905012569, 0.9556763158]], [0.14, [0.6713164971, 0.9386128232]], [0.15, [0.6532375134, 0.9202333618]], [0.16, [0.6362457160, 0.9007164787]], [0.17, [0.6203167803, 0.8802360905]], [0.18, [0.6054218550, 0.8589594729]], [0.19, [0.5915286502, 0.8370456705]], [0.20, [0.5786023984, 0.8146443015]], [0.21, [0.5666066891, 0.7918947206]], [0.22, [0.5555041806, 0.7689254991]], [0.23, [0.5452571977, 0.7458541788]], [0.24, [0.5358282237, 0.7227872568]], [0.25, [0.5271802976, 0.6998203594]], [0.26, [0.5192773283, 0.6770385661]], [0.27, [0.5120843360, 0.6545168508]], [0.28, [0.5055676314, 0.6323206071]], [0.29, [0.4996949424, 0.6105062333]], [0.30, [0.4944354973, 0.5891217535]], [0.31, [0.4897600718, 0.5682074568]], [0.32, [0.4856410070, 0.5477965395]], [0.33, [0.4820522039, 0.5279157380]], [0.34, [0.4789691008, 0.5085859440]], [0.35, [0.4763686352, 0.4898227942]], [0.36, [0.4742291971, 0.4716372301]], [0.37, [0.4725305738, 0.4540360248]], [0.38, [0.4712538901, 0.4370222741]], [0.39, [0.4703815456, 0.4205958524]], [0.40, [0.4698971501, 0.4047538316]], [0.41, [0.4697854595, 0.3894908656]], [0.42, [0.4700323114, 0.3747995395]], [0.43, [0.4706245629, 0.3606706868]], [0.44, [0.4715500300, 0.3470936755]], [0.45, [0.4727974289, 0.3340566645]], [0.46, [0.4743563209, 0.3215468332]], [0.47, [0.4762170587, 0.3095505860]], [0.48, [0.4783707364, 0.2980537334]], [0.49, [0.4808091419, 0.2870416512]], [0.50, [0.4835247122, 0.2764994216]], [0.51, [0.4865104912, 0.2664119552]], [0.52, [0.4897600904, 0.2567640978]], [0.53, [0.4932676518, 0.2475407227]], [0.54, [0.4970278132, 0.2387268097]], [0.55, [0.5010356763, 0.2303075127]], [0.56, [0.5052867758, 0.2222682169]], [0.57, [0.5097770518, 0.2145945867]], [0.58, [0.5145028230, 0.2072726054]], [0.59, [0.5194607625, 0.2002886077]], [0.60, [0.5246478742, 0.1936293057]], [0.61, [0.5300614715, 0.1872818095]], [0.62, [0.5356991573, 0.1812336431]], [0.63, [0.5415588049, 0.1754727556]], [0.64, [0.5476385402, 0.1699875286]], [0.65, [0.5539367249, 0.1647667813]], [0.66, [0.5604519408, 0.1597997722]], [0.67, [0.5671829750, 0.1550761987]], [0.68, [0.5741288055, 0.1505861950]], [0.69, [0.5812885880, 0.1463203279]], [0.70, [0.5886616430, 0.1422695920]], [0.71, [0.5962474433, 0.1384254033]], [0.72, [0.6040456026, 0.1347795924]], [0.73, [0.6120558637, 0.1313243968]], [0.74, [0.6202780876, 0.1280524531]], [0.75, [0.6287122429, 0.1249567887]], [0.76, [0.6373583947, 0.1220308133]], [0.77, [0.6462166944, 0.1192683109]], [0.78, [0.6552873696, 0.1166634316]], [0.79, [0.6645707133, 0.1142106837]], [0.80, [0.6740670738, 0.1119049258]], [0.81, [0.6837768440, 0.1097413600]], [0.82, [0.6937004509, 0.1077155253]], [0.83, [0.7038383445, 0.1058232910]], [0.84, [0.7141909869, 0.1040608518]], [0.85, [0.7247588405, 0.1024247227]], [0.86, [0.7355423561, 0.1009117350]], [0.87, [0.7465419604, 0.09951903318]], [0.88, [0.7577580429, 0.09824407260]], [0.89, [0.7691909420, 0.09708461805]], [0.90, [0.7808409304, 0.09603874340]], [0.91, [0.7927081999, 0.09510483229]], [0.92, [0.8047928449, 0.09428157995]], [0.93, [0.8170948448, 0.09356799624]], [0.94, [0.8296140453, 0.09296341000]], [0.95, [0.8423501387, 0.09246747476]], [0.96, [0.8553026420, 0.09208017590]], [0.97, [0.8684708739, 0.09180183942]], [0.98, [0.8818539302, 0.09163314240]], [0.99, [0.8954506565, 0.09157512522]], [1.00, [0.9092596193, 0.09162920574]], [1.01, [0.9232790749, 0.09179719559]]]
```

3.

```
> S := Dis(Volterra(4, 6, 7, 8, x, y), [x, y], [1, 1], 0.01, 1);
S := [[0.01, [1., 1.]], [0.02, [0.98, 1.01]], [0.03, [0.959812, 1.018484]], [0.04, [0.9395512901, 1.025394373]], [0.05, [0.9193287053, 1.030689615]], [0.06, [0.8992493005, 1.034344746]], [0.07, [0.8794112451, 1.036351317]], [0.08, [0.8599049548, 1.036717045]], [0.09, [0.8408124656, 1.035465102]], [0.10, [0.8222070463, 1.032633102]], [0.11, [0.8041530354, 1.028271842]], [0.12, [0.7867058814, 1.022443847]], [0.13, [0.7699123614, 1.015221785]], [0.14, [0.7538109478, 1.006686804]], [0.15, [0.7384322937, 0.9969268504]], [0.16, [0.7237998066, 0.9860350094]], [0.17, [0.7099302820, 0.9741079146]], [0.18, [0.6968345709, 0.9612442571]], [0.19, [0.6845182599, 0.9475434174]], [0.20, [0.6729823440, 0.9331042399]], [0.21, [0.6622238771, 0.9180239574]], [0.22, [0.6522365891, 0.9023972711]], [0.23, [0.6430114616, 0.8863155836]], [0.24, [0.6345372554, 0.8698663790]], [0.25, [0.6268009881, 0.8531327425]], [0.26, [0.6197883608, 0.8361930062]], [0.27, [0.6134841336, 0.8191205112]], [0.28, [0.6078724527, 0.8019834704]], [0.29, [0.6029371312, 0.7848449202]], [0.30, [0.5986618877, 0.7677627474]], [0.31, [0.5950305455, 0.7507897788]], [0.32, [0.5920271962, 0.7339739224]], [0.33, [0.5896363326, 0.7173583497]], [0.34, [0.5878429531, 0.7009817089]], [0.35, [0.5866326417, 0.6848783619]], [0.36, [0.5859916272, 0.6690786368]], [0.37, [0.5859068236, 0.6536090905]], [0.38, [0.5863658549, 0.6384927763]], [0.39, [0.5873570673, 0.6237495110]], [0.40, [0.5888695290, 0.6093961399]], [0.41, [0.5908930211, 0.5954467955]], [0.42, [0.5934180206, 0.5819131483]], [0.43, [0.5964356765, 0.5688046478]], [0.44, [0.5999377805, 0.5561287533]], [0.45, [0.6039167327, 0.5438911526]], [0.46, [0.6083655039, 0.5320959693]], [0.47, [0.6132775942, 0.5207459580]], [0.48, [0.6186469883, 0.5098426872]], [0.49, [0.6244681092, 0.4993867105]], [0.50, [0.6307357691, 0.4893777268]], [0.51, [0.6374451177, 0.4798147288]], [0.52, [0.6445915890, 0.4706961423]], [0.53, [0.6521708461, 0.4620199542]], [0.54, [0.6601787232, 0.4537838330]], [0.55, [0.6686111662, 0.4459852392]], [0.56, [0.6774641702, 0.4386215294]], [0.57, [0.6867337148, 0.4316900519]], [0.58, [0.6964156966, 0.4251882373]], [0.59, [0.7065058588, 0.4191136817]], [0.60, [0.7169997169, 0.4134642257]], [0.61, [0.7278924816, 0.4082380285]], [0.62, [0.7391789774, 0.4034336378]], [0.63, [0.7508535567, 0.3990500563]], [0.64, [0.7629100098, 0.3950868047]], [0.65, [0.7753414695, 0.3915439826]], [0.66, [0.7881403111, 0.3884223267]], [0.67, [0.8012980459, 0.3857232673]], [0.68, [0.8148052097, 0.3834489826]], [0.69, [0.8286512444, 0.3816024521]], [0.70, [0.8428243734, 0.3801875082]], [0.71, [0.8573114704, 0.3792088865]], [0.72, [0.8720979215, 0.3786722746]], [0.73, [0.8871674802, 0.3785843597]], [0.74, [0.9025021155, 0.3789528731]], [0.75, [0.9180818539, 0.3797866336]], [0.76, [0.9338846151, 0.3810955865]], [0.77, [0.9498860414, 0.3828908398]], [0.78, [0.9660593232, 0.3851846941]], [0.79, [0.9823750201, 0.3879906667]], [0.80, [0.9988008807, 0.3913235071]], [0.81, [1.015301660, 0.3951992027]], [0.82, [1.031838942, 0.3996349710]], [0.83, [1.048370964, 0.4046492371]], [0.84, [1.064852452, 0.4102615914]], [0.85, [1.081234466, 0.4164927249]], [0.86, [1.097464268, 0.4233643373]], [0.87, [1.113485205, 0.4308990123]], [0.88, [1.129236632, 0.4391200554]], [0.89, [1.144653870, 0.4480512877]], [0.90, [1.159668207, 0.4577167888]], [0.91, [1.174206959, 0.4681405822]], [0.92, [1.188193601, 0.4793462558]], [0.93, [1.201547976, 0.4913565102]], [0.94, [1.214186590, 0.5041926281]], [0.95, [1.226023018, 0.5178738583]], [0.96, [1.236968423, 0.5324167099]], [0.97, [1.246932201, 0.5478341528]], [0.98, [1.255822766, 0.5641347258]], [0.99, [1.263548483, 0.5813215535]], [1.00, [1.270018744, 0.5993912822]], [1.01, [1.275145204, 0.6183329455]]]
```

VolterraM

$\triangleright S := \text{Dis}(\text{VolterraM}(4, 6, 7, 8, 10, x, y), [x, y], [1, 1], 0.01, 1);$
 $S := [[0.01, [1, 1]], [0.02, [0.975000000, 1.03]], [0.03, [0.9489918750, 1.058325000]], [0.04, [0.9221881125, 1.084676433]], [0.05, [0.8948069397, 1.108776654]], [0.06, [0.8670673573, 1.130376392]], [0.07, [0.8391842743, 1.149261292]], [0.08, [0.8113639738, 1.165257202]], [0.09, [0.7838001125, 1.178233969]], [0.10, [0.7566704088, 1.188107583]], [0.11, [0.7301341236, 1.194840637]], [0.12, [0.7043303741, 1.198441184]], [0.13, [0.6793772710, 1.198960154]], [0.14, [0.6553718178, 1.196487571]], [0.15, [0.6323904753, 1.191147864]], [0.16, [0.6104902720, 1.183094570]], [0.17, [0.5897103274, 1.172504723]], [0.18, [0.5700736604, 1.159573206]], [0.19, [0.5515891584, 1.144507296]], [0.20, [0.5342536027, 1.127521567]], [0.21, [0.5180536646, 1.108833303]], [0.22, [0.5029678038, 1.088658488]], [0.23, [0.4889680228, 1.067208411]], [0.24, [0.4760214479, 1.044686901]], [0.25, [0.4640917214, 1.021288155]], [0.26, [0.4531402019, 0.9971951220]], [0.27, [0.4431269779, 0.9725783834]], [0.28, [0.4340117062, 0.9475954686]], [0.29, [0.4257542920, 0.9223905384]], [0.30, [0.4183154263, 0.8970943738]], [0.31, [0.4116569995, 0.8718246091]], [0.32, [0.4057424099, 0.8466861568]], [0.33, [0.4005367829, 0.8217717740]], [0.34, [0.3960071162, 0.7971627321]], [0.35, [0.3921223658, 0.7729295524]], [0.36, [0.3888534828, 0.7491327802]], [0.37, [0.3861734136, 0.7258237747]], [0.38, [0.3840570699, 0.7030454950]], [0.39, [0.3824812779, 0.6808332697]], [0.40, [0.3814247107, 0.6592155387]], [0.41, [0.3808678093, 0.6382145606]], [0.42, [0.3807926973, 0.6178470796]], [0.43, [0.3811830904, 0.5981249496]], [0.44, [0.3820242043, 0.5790557148]], [0.45, [0.3833026621, 0.5606431447]], [0.46, [0.3850064033, 0.5428877256]], [0.47, [0.3871245948, 0.5257871099]], [0.48, [0.3896475440, 0.5093365244]], [0.49, [0.3925666162, 0.4935291403]], [0.50, [0.3958741542, 0.4783564070]], [0.51, [0.3995634023, 0.4638083523]], [0.52, [0.4036284332, 0.4498738519]], [0.53, [0.4080640783, 0.4365408701]], [0.54, [0.4128658611, 0.4237966740]], [0.55, [0.4180299337, 0.4116280247]], [0.56, [0.4235530158, 0.4000213466]], [0.57, [0.4294323357, 0.3889628771]], [0.58, [0.4356655743, 0.3784387994]], [0.59, [0.4422508094, 0.3684353591]], [0.60, [0.4491864628, 0.3589389676]], [0.61, [0.4564712474, 0.3499362924]], [0.62, [0.4641041159, 0.3414143375]], [0.63, [0.4720842094, 0.3333605138]], [0.64, [0.4804108062, 0.3257627013]], [0.65, [0.4890832704, 0.3186093044]], [0.66, [0.4981010002, 0.3118893012]], [0.67, [0.5074633748, 0.3055922874]], [0.68, [0.5171697008, 0.2997085166]], [0.69, [0.5272191565, 0.2942289368]], [0.70, [0.5376107347, 0.2891452244]], [0.71, [0.5483431830, 0.2844498164]], [0.72, [0.5594149420, 0.2801359411]], [0.73, [0.5708240804, 0.2761976483]], [0.74, [0.5825682269, 0.2726298398]], [0.75, [0.5946444984, 0.2694282992]], [0.76, [0.6070494246, 0.2665897239]], [0.77, [0.6197788683, 0.2641117570]], [0.78, [0.6328279406, 0.2619930226]], [0.79, [0.6461909119, 0.2602331615]], [0.80, [0.6598611167, 0.2588328706]], [0.81, [0.6738308531, 0.2577939444]], [0.82, [0.6880912763, 0.2571193196]], [0.83, [0.7026322856, 0.2568131233]], [0.84, [0.7174424049, 0.2568807239]], [0.85, [0.7325086556, 0.2573287856]], [0.86, [0.7478164234, 0.2581653269]], [0.87, [0.7633493170, 0.2593997811]], [0.88, [0.7790890201, 0.2610430610]], [0.89, [0.7950151354, 0.2631076250]], [0.90, [0.8111050228, 0.2656075456]], [0.91, [0.8273336300, 0.2685585788]], [0.92, [0.8436733179, 0.2719782327]], [0.93, [0.8600936806, 0.2754885832]], [0.94, [0.8765613623, 0.2803025921]], [0.95, [0.8930398724, 0.2852516529]], [0.96, [0.9094894002, 0.2907581472]], [0.97, [0.9258666342, 0.2968492222]], [0.98, [0.9421245870, 0.3035540556]], [0.99, [0.9582124324, 0.3109038456]], [1.00, [0.9740753586, 0.3189317694]], [1.01, [0.9896544443, 0.3276729033]]]$

1. $\triangleright$

$\triangleright S := \text{Dis}(\text{VolterraM}(1, 2, 3, 4, 6, x, y), [x, y], [1, 1], 0.01, 1);$
 $S := [[0.01, [1, 1]], [0.02, [0.987500000, 1.03]], [0.03, [0.9745946094, 1.060127500]], [0.04, [0.9613020780, 1.090315348]], [0.05, [0.9476423964, 1.120493233]], [0.06, [0.9336372173, 1.150588050]], [0.07, [0.9193097568, 1.180524318]], [0.08, [0.9046846778, 1.210224639]], [0.09, [0.8897879549, 1.239610201]], [0.10, [0.8746467234, 1.268601309]], [0.11, [0.8592891138, 1.297117949]], [0.12, [0.8437440738, 1.325080371]], [0.13, [0.8280411802, 1.352409683]], [0.14, [0.8122104433, 1.379028448]], [0.15, [0.7962821071, 1.404861273]], [0.16, [0.7802864473, 1.429835389]], [0.17, [0.7642535709, 1.453881198]], [0.18, [0.7482132199, 1.476932796]], [0.19, [0.7321945816, 1.498928451]], [0.20, [0.7162261094, 1.519811034]], [0.21, [0.7003353540, 1.539528404]], [0.22, [0.6845488101, 1.558033722]], [0.23, [0.6688917779, 1.575285718]], [0.24, [0.6533882419, 1.591248886]], [0.25, [0.6380607676, 1.605893618]], [0.26, [0.6229304171, 1.619196272]], [0.27, [0.6080166833, 1.631139181]], [0.28, [0.5933374427, 1.641710596]], [0.29, [0.5789089265, 1.650904580]], [0.30, [0.5647457089, 1.658720847]], [0.31, [0.5508607121, 1.665164551]], [0.32, [0.5372652258, 1.670246038]], [0.33, [0.5239689410, 1.673980564]], [0.34, [0.5109799953, 1.676387976]], [0.35, [0.4983050295, 1.677492380]], [0.36, [0.4859492522, 1.677321782]], [0.37, [0.4739165127, 1.675907725]], [0.38, [0.4622093788, 1.673284914]], [0.39, [0.4508292192, 1.669490846]], [0.40, [0.4397762888, 1.664565436]], [0.41, [0.4290498155, 1.658550658]], [0.42, [0.4186480872, 1.651490189]], [0.43, [0.4085685383, 1.643429076]], [0.44, [0.3988078348, 1.634413409]], [0.45, [0.3893619564, 1.624490019]], [0.46, [0.3802262769, 1.613706195]], [0.47, [0.3713956396, 1.602109419]], [0.48, [0.3628644302, 1.589747123]], [0.49, [0.3546266443, 1.576666470]], [0.50, [0.3466759518, 1.562914152]], [0.51, [0.3390057558, 1.548536212]], [0.52, [0.3316092473, 1.533577887]], [0.53, [0.3244794558, 1.518083467]], [0.54, [0.3176092952, 1.502096177]], [0.55, [0.3109916048, 1.485658074]], [0.56, [0.3046191876, 1.468809963]], [0.57, [0.2984848434, 1.451591326]], [0.58, [0.2925813986, 1.434040267]], [0.59, [0.2869017328, 1.416193469]], [0.60, [0.2814388014, 1.398086167]], [0.61, [0.2761856560, 1.379752124]], [0.62, [0.2711354614, 1.361223625]], [0.63, [0.2662815100, 1.342531476]], [0.64, [0.2616172343, 1.323705011]], [0.65, [0.2571362168, 1.304772104]], [0.66, [0.2528321981, 1.285759191]], [0.67, [0.2486990834, 1.266691294]], [0.68, [0.2447309468, 1.247592053]], [0.69, [0.2409220355, 1.228483754]], [0.70, [0.2372667712, 1.209387369]], [0.71, [0.2337597514, 1.190322594]], [0.72, [0.2303957496, 1.171307887]], [0.73, [0.2271697144, 1.152360512]], [0.74, [0.2240767681, 1.133496582]], [0.75, [0.2211122048, 1.114731100]], [0.76, [0.2182714873, 1.096078006]], [0.77, [0.2155502446, 1.077550221]], [0.78, [0.2129442680, 1.059159687]], [0.79, [0.2104495078, 1.040917415]], [0.80, [0.2080620692, 1.022833526]], [0.81, [0.2057782081, 1.004917292]], [0.82, [0.2035943269, 0.9871771780]], [0.83, [0.2015069700, 0.9696208831]], [0.84, [0.1995128198, 0.9522553786]], [0.85, [0.1976086915, 0.9350869466]], [0.86, [0.1957915292, 0.9181212167]], [0.87, [0.1940584016, 0.9013632016]], [0.88, [0.1924064970, 0.8848173317]], [0.89, [0.1908331192, 0.8684874879]], [0.90, [0.1893356837, 0.8523770339]], [0.91, [0.1879117127, 0.8364888462]], [0.92, [0.1865588318, 0.8208253439]], [0.93, [0.1852747653, 0.8053885166]], [0.94, [0.1840573327, 0.7901799512]], [0.95, [0.1829044450, 0.7752008576]], [0.96, [0.1818141007, 0.7604520929]], [0.97, [0.1807843825, 0.7459341849]], [0.98, [0.1798134538, 0.7316473545]], [0.99, [0.1788995553, 0.7175915362]], [1.00, [0.1780410021, 0.7037663985]], [1.01, [0.1772361801, 0.6901713630]]]$

2.

```

> S := Dis(VolterraM(12, 4, 7, 88, 6, x, y), [x, y], [1, 1], 0.01, 1);
S := [[0.01, [1., 1.]], [0.02, [1.078636364, 0.99]], [0.03, [1.163772196, 0.9847710000]], [0.04, [1.255736033, 0.9845999765]], [0.05, [1.354818169, 0.9898618382]], [0.06,
[1.461250039, 1.001036478]], [0.07, [1.575177753, 1.018729800]], [0.08, [1.696628428, 1.043699545]], [0.09, [1.825467734, 1.076886796]], [0.10, [1.961346888, 1.119454046]],
[0.11, [2.103637259, 1.172830526]], [0.12, [2.251350844, 1.238764989]], [0.13, [2.403045460, 1.319385116]], [0.14, [2.556714726, 1.417260703]], [0.15, [2.709665436,
1.535464333]], [0.16, [2.858389294, 1.677617508]], [0.17, [2.998443212, 1.847901317]], [0.18, [3.124363318, 2.050997855]], [0.19, [3.229653082, 2.291911753]], [0.20,
[3.306904632, 2.575602721]], [0.21, [3.348130078, 2.906346885]], [0.22, [3.345386261, 3.286752248]], [0.23, [3.291753095, 3.716406940]], [0.24, [3.182647834, 4.190268097]],
[0.25, [3.017307057, 4.697118191]], [0.26, [2.800063250, 5.218678790]], [0.27, [2.540874220, 5.730129116]], [0.28, [2.254593939, 6.202592319]], [0.29, [1.958840502,
6.607470480]], [0.30, [1.670949781, 6.921526393]], [0.31, [1.405035462, 7.130950926]], [0.32, [1.170178172, 7.232938697]], [0.33, [0.9701792227, 7.234462607]], [0.34,
[0.8045681976, 7.149173744]], [0.35, [0.6701537452, 6.993851452]], [0.36, [0.5624815475, 6.785499195]], [0.37, [0.4768791749, 6.539517336]], [0.38, [0.4090521810,
6.268864700]], [0.39, [0.3553385630, 5.983901738]], [0.40, [0.3127545685, 5.692607279]], [0.41, [0.2789361747, 5.400948105]], [0.42, [0.2520416252, 5.113272926]], [0.43,
[0.2306496905, 4.832669278]], [0.44, [0.2136689620, 4.561261649]], [0.45, [0.2002629797, 4.300449337]], [0.46, [0.1897910164, 4.051091131]], [0.47, [0.1817623912,
3.813646394]], [0.48, [0.1758017274, 3.588281795]], [0.49, [0.1716227443, 3.374951637]], [0.50, [0.1690085701, 3.173458130]], [0.51, [0.1677969830, 2.983496558]], [0.52,
[0.1678693578, 2.804689102]], [0.53, [0.1691423990, 2.636610146]], [0.54, [0.1715619718, 2.478805190]], [0.55, [0.1750985236, 2.330804949]], [0.56, [0.1797437178,
2.192135833]], [0.57, [0.1855080020, 2.062327684]], [0.58, [0.1924189036, 1.940919443]], [0.59, [0.2005198998, 1.827463257]], [0.60, [0.2098697484, 1.721527394]], [0.61,
[0.2205421956, 1.622698267]], [0.62, [0.2326259959, 1.530581794]], [0.63, [0.2462251978, 1.444804255]], [0.64, [0.2614596601, 1.365012790]], [0.65, [0.2784657684,
1.290875642]], [0.66, [0.2973973328, 1.222082228]], [0.67, [0.3184266459, 1.158343112]], [0.68, [0.3417456843, 1.099389933]], [0.69, [0.3675674366, 1.044975344]], [0.70,
[0.3961273375, 0.9948730044]], [0.71, [0.4276847847, 0.9488776778]], [0.72, [0.4625247085, 0.9068054731]], [0.73, [0.5009591545, 0.8684942862]], [0.74, [0.5433288283,
0.8338044960]], [0.75, [0.5900045330, 0.8026199825]], [0.76, [0.6413884107, 0.7748495494]], [0.77, [0.6979148677, 0.7504288522]], [0.78, [0.7600510267, 0.7293229597]], [0.79,
[0.8282965012, 0.7115297124]], [0.80, [0.9031822216, 0.6970840868]], [0.81, [0.9852679598, 0.6860638380]], [0.82, [1.075138092, 0.6785967724]], [0.83, [1.173394996,
0.6748701126]], [0.84, [1.280649296, 0.6751425575]], [0.85, [1.397505928, 0.6797598290]], [0.86, [1.524544690, 0.6891747444]], [0.87, [1.662293531, 0.7039731741]], [0.88,
[1.811192326, 0.7249076551]], [0.89, [1.971544221, 0.7529409501]], [0.90, [2.143450836, 0.7893024663]], [0.91, [2.326726630, 0.8355611556]], [0.92, [2.520786670,
0.8937192182]], [0.93, [2.724501007, 0.9663314024]], [0.94, [2.936008149, 1.056654457]], [0.95, [3.152480541, 1.168829411]], [0.96, [3.369837727, 1.308094070]], [0.97,
[3.582410474, 1.481011370]], [0.98, [3.782575653, 1.695676013]], [0.99, [3.960413076, 1.961820060]], [1.00, [4.103489471, 2.290669725]], [1.01, [4.196956881, 2.694307190]]]

```

3. ↵