Homework for Lecture 14 of Dr. Z.'s Dynamical Models in Biology class

Email the answers (as .pdf file) to

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by 8:00pm Monday, Oct. 27, 2025.

Subject: hw14

with an attachment hw14FirstLast.pdf and/or hw14FirstLast.txt (preferred)

Using

`http://sites.math.rutgers.edu/~zeilberg/Bio25/DMB14.txt`

1. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
T:=RT([x],10);SSSg(T,[x]); SSg(T,[x],z);ORB(T,[x],[6.],1000,1010)[-1];
```

Run it **twenty** times. Out of these twenty times, how many times did the first and third numbers agree?

2. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
T:=RT([x,y],10);SSg(T,[x,y]); SSSg(T,[x,y]);ORB(T,[x,y],[6.,8.],1000,1010)[-1];
```

Run it **twenty** times. Out of these twenty times, how many times did the first and third numbers agree?

3. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
T:=RT([x,y,z],10);SSg(T,[x,y,z]); SSSg(T,[x,y,z]);

ORB(T,[x,y,z],[6.,8.,11.],1000,1010)[-1];
```

Run it **twenty** times. Out of these twenty times, how many times did the first and third numbers agree?

4. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`:

```
f:=RR([z[1],z[2]],10); T:=RecToTs(2,z,f);SSg(T,[z[1],z[2]]); SSSg(T,[z[1],z[2]]);
```

```
Orbk(2,z,f,[5.,8.],2000,2010)[-1];
```

5. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
f:=RR([z[1],z[2],z[3]],10); T:=RecToTs(3,z,f);SSg(T,[z[1],z[2],z[3]]);
```

```
SSSg(T,[z[1],z[2],z[3]]); Orbk(3,z,f,[5.,8.,11.],2000,2010)[-1];
```

Run it **twenty** times. Out of these twenty times, how many times did the last coordinate of the first point and the third numbers agree?

6. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
L:=rand(1..3)(); a:=rand(1..50)()/20.;c:=rand(1..50)()/20.; T:=NicholsonBailey(L,a,c,N,P)
```

```
;SSg(T,[N,P]);SSSg(T,[N,P]);
```

Run it **twenty** times. Out of these twenty times, how many times did you get a non-empty set of stable steady-states? (ignore those that have an error message)

7. Copy-and-paste the following line into your worksheet (once you have donwloaded and read `DMB14.txt`):

```
a:=rand(1..10)()/10.:  r:=rand(1..10)()/10.:  K:=rand(1..10)():
```

```
T:=NicholsonBaileyM(a,r,K,14,N,P); SSSg(T,[N,P]);
```

Run it **100** times. Out of these fifty times, how many times did you get a non-empty set of stable steady-states? (ignore those that have an error message)

Daniyal Chaudhry

1. All 20 times!!
2. Actually, 14 times. Even crazier, it was the last 14 times I ran it (the first 6 disagreed). Crazy!
3. 8 times
4. This question has no instructions, but I'll do the same thing: It actually worked all 20 times!
5. Wow, again all 20 times!
6. I did not get a single nonempty set of Stable SS in 20 runs.
7. The question says 100 & 50, so I'll run it 100 times for fun.
   Tally count: 卌 卌 卌 卌 卌 卌 卌 卌 卌 II   47 times nonempty SSS out of 100!

Overall, this was an interesting look into Maple's accuracy & competence with SSS and orbits. I was surprised by my own results & am curious to see if others had similar situations!