

> #OK to post

>

>

> # Anne Somalwar, hw25, 12.2.2021

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>

> **read** "/Users/annesomalwar/Library/Mobile
Documents/iCloud~is~workflow~my~workflows/Documents/
DMB.txt"

First Written: Nov. 2021

*This is DMB.txt, A Maple package to explore Dynamical models
in Biology (both discrete and continuous)
accompanying the class Dynamical Models in Biology, Rutgers
University. Taught by Dr. Z. (Doron Zeilbeger)*

*The most current version is available on WWW at:
<http://sites.math.rutgers.edu/~zeilberg/tokhniot/DMB.txt> .
Please report all bugs to: DoronZeil at gmail dot com .*

*For general help, and a list of the MAIN functions,
type "Help();". For specific help type "Help(procedure_name);"*

*For a list of the supporting functions type: Help1();
For help with any of them type: Help(ProcedureName);*

For a list of the functions that give examples of Discrete-time dynamical systems (some famous), type: HelpDDM());

For help with any of them type: Help(ProcedureName);

For a list of the functions continuous-time dynamical systems (some famous) type: HelpCDM());

For help with any of them type: Help(ProcedureName);

(1)

> #P11')

>

> Orb($[x^2 - 2 \cdot x + 2]$, $[x]$, [1.0], 1000, 1010)

[[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000]]

(2)

> Orb($[x^2 - 2 \cdot x + 2]$, $[x]$, [1.01], 1000, 1010)

[[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000], [1.000000000],
[1.000000000], [1.000000000]]

(3)

> Orb($[x^2 - 2 \cdot x + 2]$, $[x]$, [2.0], 1000, 1010)

[[2.], [2.], [2.], [2.], [2.], [2.], [2.], [2.], [2.], [2.],
[2.]]

(4)

> Orb($[x^2 - 2 \cdot x + 2]$, $[x]$, [2.01], 1000, 1010)

```
[ [ Float( undefined ) ], [ Float( undefined ) ], [
Float( undefined ) ], [ Float( undefined ) ], [
Float( undefined ) ], [ Float( undefined ) ], [
Float( undefined ) ], [ Float( undefined ) ], [
Float( undefined ) ], [ Float( undefined ) ], [ Float( undefined ) ] ] ]
```

```
> Orb( [  $x^2 - 2 \cdot x + 2$  ], [  $x$  ], [ 1.99 ], 1000, 1010 )
[ [ 1.0000000000 ], [ 1.0000000000 ], [ 1.0000000000 ],
[ 1.0000000000 ], [ 1.0000000000 ], [ 1.0000000000 ],
[ 1.0000000000 ], [ 1.0000000000 ], [ 1.0000000000 ],
[ 1.0000000000 ], [ 1.0000000000 ] ]
```

```
> # Looks like 1 is stable and 2 is not
```

```
>
```

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>
```

```
> #P12')
```

```
>
```

```
> Orb( [  $\frac{5}{2} \cdot x \cdot (1 - x)$  ], [  $x$  ], [ 0.0 ], 1000, 1010 )
[ [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ], [ 0. ],
[ 0. ] ]
```

```
> Orb( [  $\frac{5}{2} \cdot x \cdot (1 - x)$  ], [  $x$  ], [ 0.01 ], 1000, 1010 )
[ [ 0.6000000000 ], [ 0.6000000000 ], [ 0.6000000000 ],
[ 0.6000000000 ], [ 0.6000000000 ], [ 0.6000000000 ],
[ 0.6000000000 ], [ 0.6000000000 ], [ 0.6000000000 ],
[ 0.6000000000 ], [ 0.6000000000 ] ]
```

```
> Orb( [  $\frac{5}{2} \cdot x \cdot (1 - x)$  ], [  $x$  ], [ 0.6 ], 1000, 1010 )
[ [ 0.6000000000 ], [ 0.6000000000 ], [ 0.6000000000 ],
```

```

[ 0.6000000000], [ 0.6000000000], [ 0.6000000000],
[ 0.6000000000], [ 0.6000000000], [ 0.6000000000],
[ 0.6000000000], [ 0.6000000000]]
> Orb( [ [ 5/2 * x * (1 - x) ], [ x ], [ 0.61 ], 1000, 1010 )
[ [ 0.6000000000], [ 0.6000000000], [ 0.6000000000],
  [ 0.6000000000], [ 0.6000000000], [ 0.6000000000],
  [ 0.6000000000], [ 0.6000000000], [ 0.6000000000],
  [ 0.6000000000], [ 0.6000000000]]
> #Looks like 0.6 is stable and 0 is not.
>
>
>
>
>

```

(10)