

```
> #Hrudai Battini Homework 8 RUID: 185007576
read "/Users/hb334/documents/M9.txt";
Help9();
      Orb(f,x0,K1,K2), Orb2D(f,x0,K), FP(f,x), SFP(f,x), Comp(f,x) (1)
```

```
> #1
Digits := 10;
f := evalf((8*x-7)/(4+x) -x);
Orb(f,x,1,1000,1005);
FP(f,x);
SFP(f,x);
#At the first 1000 terms of this nonlinear recurrence the 1000th
term equals 288.9795679.
#There is not a steady state due to the recurrence oscillating
and therefore no stable fixed point.
```

*Digits := 10*

$$f := \frac{8 \cdot x - 7}{4 + x} - 1 \cdot x$$

[288.9795679, -281.1126830, 289.2534200, -281.3864108, 289.5270089, -281.6598757,  
289.8003353]

[-1.870828693 I, 1.870828693 I]

[ ]

(2)

```
> #2
f2 := evalf(0.5*(x)*(1-(x)));
f3 := evalf(1*(x)*(1-(x)));
f4 := evalf(2*(x)*(1-(x)));
f5 := evalf(2.5*(x)*(1-(x)));
f6 := evalf(3.1*(x)*(1-(x)));
f7 := evalf(3.5*(x)*(1-(x)));

Orb(f2,x,0.5,1000,1005);
Orb(f3,x,0.5,1000,1005);
Orb(f4,x,0.5,1000,1005);
Orb(f5,x,0.5,1000,1005);
Orb(f6,x,0.5,1000,1005);
Orb(f7,x,0.5,1000,1005);
#There is a very tiny oscillation at 0.5, a more stable but still
oscillating set of orbitals at 1, stability at 2 and 2.5.
#The orbital oscillates again at 3.1 and 3.5 again with a more
pronounced oscillation at 3.5.
```

$$f2 := 0.5 x (1 - 1 \cdot x)$$

$$f3 := x (1 - 1 \cdot x)$$

$$f4 := 2 \cdot x (1 - 1 \cdot x)$$

$$f5 := 2.5 x (1 - 1 \cdot x)$$

$$f6 := 3.1 x (1 - 1 \cdot x)$$

$$f7 := 3.5 x (1 - 1 \cdot x)$$

[1.833428362 × 10<sup>-302</sup>, 9.167141810 × 10<sup>-303</sup>, 4.583570905 × 10<sup>-303</sup>, 2.291785452

```

    × 10-303, 1.145892726 × 10-303, 5.729463630 × 10-304, 2.864731815 × 10-304]
[0.0009913908610, 0.0009904080051, 0.0009894270971, 0.0009884481311,
 0.0009874711014, 0.0009864960022, 0.0009855228278]
[0.5000000000, 0.5000000000, 0.5000000000, 0.5000000000, 0.5000000000, 0.5000000000,
 0.5000000000]
[0.6000000000, 0.6000000000, 0.6000000000, 0.6000000000, 0.6000000000, 0.6000000000,
 0.6000000000]
[0.5580141245, 0.7645665203, 0.5580141245, 0.7645665203, 0.5580141245, 0.7645665203,
 0.5580141245]
[0.5008842111, 0.8749972637, 0.3828196827, 0.8269407062, 0.5008842111, 0.8749972637,
 0.3828196827]

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(3)

```

> #3
d := -x(n) + (1*x(n-1)+8*x(n-2))/(1*x(n-1)+5*x(n-2));
b := rsolve({d,x(0) = 0.5, x(1)=0.7}, x(n), 'makeproc');
b(1000);
b(1001);
#There is a steady state at 1.5.

```

$$d := -x(n) + \frac{x(n-1) + 8x(n-2)}{x(n-1) + 5x(n-2)}$$

```

b := proc(n) ... end proc

```

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1.5000000000

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1.5000000000

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(4)

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>

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