Instructions for Predator-Prey Population Dynamics Code

Population of prey in generation t: $N(t) \rightarrow N(t+1) = N(t)*[1+B*(100-N(t))]-K* N(t)* P(t)$

$N_{max}=100$ can be sustained by environment with limited resources, **kill rate= K**

Population of predator in generation t: $P(t) \rightarrow P(t+1) = Q*N(t)* P(t)$, **Q=efficiency** of prey use

Populations in relative units.

Suggestions to explore dynamics with different parameters and initial conditions:
a) N(0)= 60, 70
b) P(0)= 0.25, 0.3
c) B=0.0055, 0.0006, 0.00065
d) K= 0.25, 0.3, 0.19, 0.18
Which parameters may be changed slightly while maintaining a stable state of P & N?
Which parameters lead to population extinction or explosion?

B2			f_x	N(t+1)=(1.0+B*(100-N(t)))*N(t)-K*N(t)*P(t)			
	A	B	C	D	E	F	G	H
1	**Prey and Predator**						
2		N(t+1)=(1.0+B*(100-N(t)))*N(t)-K*N(t)*P(t)				This is used as 2 comment lines defining the equations to code		
3		P(t+1)=Q*N(t)*P(t)						
4								
5		#Prey t=0	#Predators	Birth rate	Kill rate	Efficiency in use of prey		
6		N0	P0	B	K	Q		
7		50	0.2	0.005	0.5	0.0205		
8								

B3			f_x	P(t+1)=Q*N(t)*P(t)		
	A	B	C	D	E	F	G
1	**Prey and Predator**						
2		N(t+1)=(1.0+B*(100-N(t)))*N(t)-K*N(t)*P(t)			This is used as 2 comment lines defining the equations to code		
3		P(t+1)=Q*N(t)*P(t)					
4							
5		#Prey t=0	#Predators	Birth rate	Kill rate	Efficiency in use of prey	
6		N0	P0	B	K	Q	
7		50	0.2	0.005	0.5	0.0205	

Prey and Predator

B11 fx `=(1-B*(B10-100))*B10-K*B10*C10`

$N(t+1)=(1.0+B*(100-N(t)))*N(t)-K*N(t)*P(t)$

$P(t+1)=Q*N(t)*P(t)$

#Prey t=0	#Predators	Birth rate	Kill rate	Efficiency in use o...
N0	P0	B	K	Q
50	0.2	0.005	0.5	0.0205

0	50	0.2
1	57.5	0.205

Storage cells for naming and defining values of parameters used in program, change to explore different conditions

Initial populations, vary to see correlations!

C11 fx `=Q*B10*C10`

Prey and Predat...

$N(t+1)=(1.0+B...$

$P(t+1)=Q*N(t)*P(t)$

#Prey t=0	#Predators	Birth rate	Kill rate	Efficiency in use of prey
N0	P0	B		
50	0.2	0.005		

Cells in column B have the formula for the iterative prey population

Cells in column C have the formula for the iterative predator population

0	50	0.2
1	57.5	0.205
2	63.825	0.241644
3	67.65789	0.31617
4	67.9032	0.438523
5	63.91201	0.610431
6	55.93735	0.799785
7	45.89218	0.917125
8	37.26336	0.862822
9	32.87643	0.659109
10	33.07577	0.444217
11	36.7972	0.301203
12	42.88392	0.22721
13	50.25889	0.199745
14	57.73907	0.205799
15	63.99828	0.243594
16	67.72372	0.319587
17	67.83126	0.443694
18	63.69332	0.616975
19	55.6072	0.805592
20	45.55164	0.918333
21	37.03692	0.857547

Predator-Prey Evolution

Population Prey — Population Predators — Axis Title — Prey — Predator