Dynamical Systems
Week 5 – Monday
Mathematical Modeling (Math 420/620)

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Mathematics & Statistics Colloquia

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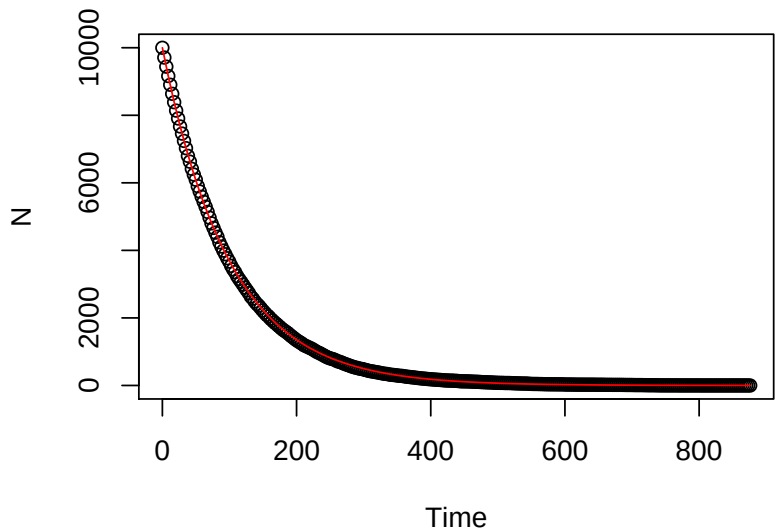
Interactions: Averaged vs More Complex?

Available Analytical and Computational Tools?

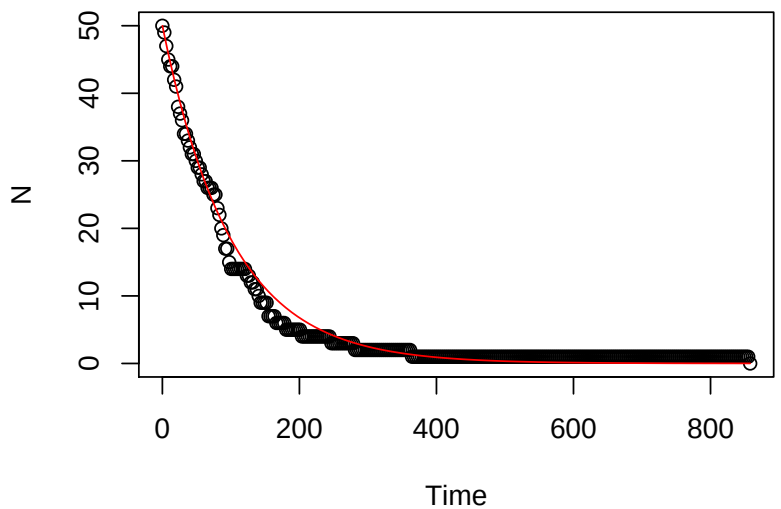
Example: Exponential Decay

```
## Ex: tracking atoms experiencing radioactive decay
Ts=sort(rexp(1e4,1/100))
Time=seq(0,max(Ts),length=300)
N=Time*0; # counts of atoms at time t go here.
N[1]=1e4;
for(i in 2:300) { N[i]=sum(Ts > Time[i]) } # number not yet decayed
plot(Time,N);  curve(1e4*(exp(-x/100)),0,max(Ts),add=TRUE,col="red")
```



Example: Exponential Decay

```
## Ex: tracking atoms experiencing radioactive decay
Ts=sort(rexp(50,1/100))
Time=seq(0,max(Ts),length=300)
N=Time*0; # counts of atoms at time t go here.
N[1]=50;
for(i in 2:300) { N[i]=sum(Ts > Time[i]) } # number not yet decayed
plot(Time,N);  curve(50*(exp(-x/100)),0,max(Ts),add=TRUE,col="red")
```



Example: Exponential Decay

Which (implicit) assumptions could be relaxed?

Spatially structured interactions?

Small N vs $N \to \infty$?

Time-dependent or N-dependent rate?

Others?