

Homework for Lecture 16 of Dr. Z.'s Dynamical Models in Biology class

Email the answers (as a .pdf file) to

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by 8:00pm Monday, Nov. 3, 2025.

Subject: hw16

with an attachment hw16FirstLast.pdf

1. For the generalized Hardy-Weinberg model given by $\text{HWg}(u,v,M)$ where M is a 3 by 3 preference matrix

Type

```
M:=RandMat(3,30); T:=HWg(u,v,M); SSSgN(T,[u,v]);
```

40 times and record in how many cases only one of the alleles AA, Aa, aa will survive (i.e. the output is close to [0,1], [1,0], or [0,0]) and in how many of them they will also survive.

2. for each of $b=c=0.1, 0.15, 0.2, 0.25, 0.3, 0.35, 0.4$

Using

```
SSSgN(AllenSIR(a,b,c,x,y),[x,y]);
```

for $a=(b+c)/2$, $a=(b+c)$, $a=1.5*(b+c)$, $a=2*(b+c)$, $a=10*(b+c)$, $a=100*(b+c)$

Confirm, in each case, that in the Linda Allen model, for $a = (b + c)/2$ in the long run there are no infected individuals, but after $a = (b + c)$, they will start showing up. Also confirm that even for large a , they will not all be infected but x_n and y_n tend to some number.