Homework for Lecture 10 of Dr. Z.'s Dynamical Models in Biology class

Email the answers (as .pdf file) to

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by 8:00pm Monday, Oct. 13, 2025.

Subject: hw8

with an attachment hw8FirstLast.pdf and/or hw8FirstLast.txt

Using

`http://sites.math.rutgers.edu/~zeilberg/Bio25/DMB10.txt`

1. Using procedure `ExactPD` find the probability of winning, and expected duration of the game in a Gambler's Ruin with max. capital 40 dollars, starting capital 20 dollars and prob. of winning a dollar at any one round $\frac{19}{40}$.

Now using `EstPD`, estimate it with (i) `K=100`, (ii) `K=1000` (iii) `K=5000` (Warning: this may take some time) Which of them gives the best estimate? Can you explain why?

2.

Plot `ForPD(n,100,p)[1]` from `p=0.45` to `p=0.5` for `n=10,20,30,40,50,60,70,80,90`.

1)

```
> ExactPD(20, 40, 19/40);
                    [0.1190277811, 304.7777751]                    (2)
> EstPD(20, 40, 19/40, 100);
                    [0.1100000000, 292.0600000]                    (3)
> EstPD(20, 40, 19/40, 1000);
                    [0.1310000000, 308.3000000]                    (4)
> EstPD(20, 40, 19/40, 5000);
                    [0.1234000000, 307.1728000]                    (5)
```

K=5000 gives the best estimate because more trials reduce sampling variability

2)