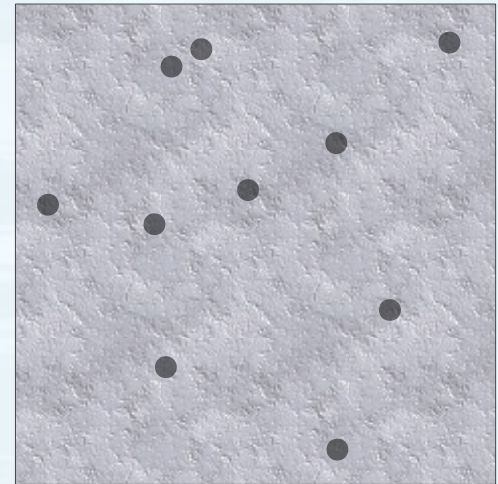# Raining on the Sidewalk

- A given square of sidewalk is 1 yard square

- It starts to rain, let's say that for every square foot, an average of 10 rain drops fall per second. Thus, 90 raindrops fall on this square per second. When a raindrop falls, it is equally likely to fall anywhere on the square.

Questions

- For any given square inch, what is the probability that it will still be dry after 30 second?

- For any given square inch, what is the expected number of seconds until a raindrop hits it?

- These are answered on the next two slides. *Try to answer them yourselves first.*

Dry sq. inch after 30 sec

- How many square inches are there in the square yard? 36X36 = 1296

- For a drop of water, the probability that it hits any given square inch is 1/1296

- So the probability that it DOESN'T hit a square inch is 1295/1296

- In 30 seconds there are 90x30=2700 drops

- The Probability that all 2700 drops miss this sq. inch is (1295/1296)^2700 = .1244, about 12.44%

Expected seconds until a drop

- We can figure out the probability that a square inch gets wet during any second, it is 1-P(it stays dry)

  This is $1-(1295/1296)^{90}=.06711$

- This question is asking for E(X) for a geometric X with p=.06711, the Expected Value is $1/p = 1/.0671=14.901$

- So on average, any given square inch will get its first drop at 14.9 seconds