

The Clod Problem

Introduction

It was a long drive home when we hit the traffic jam. It took 25 minutes to go the one mile distance past the road construction. There was no reason for the delay since the speed limit through the one lane section was still 55 mph; it had to be a “clod¹” on the road.

This made me think about the chances of being held up by “road clods.” This paper derives the minimum number of cars placed in a row, n_{\min} , on a one lane highway so that the probability of having at least one clod in the group is greater than $\frac{1}{2}$. The paper is divided into a section with the derivation of the formula and a short section which presents a table of n_{\min} for several values of the probability of finding a “road clod.”

The Formula

We will assume that we are given the probability of finding a “road clod,” p . The probability that a person *isn't* a “road clod” is then given by $(1 - p)$. Given n cars the probability that *none* of them is being driven by a “road clod” is then $(1 - p)^n$. When this probability drops below $\frac{1}{2}$ the probability of having *at least one* “road clod,” $1 - (1 - p)^n$, will be greater than $\frac{1}{2}$. We therefore wish to find n such that

$$(1 - p)^n \leq \frac{1}{2}.$$

The minimum value of n , n_{\min} , will be the next integral value of n when the equality is satisfied;

$$(1 - p)^n = \frac{1}{2}.$$

This can easily be solved for n_{\min} ;

$$n_{\min} = \left\lceil \frac{-\ln(2)}{\ln(1 - p)} \right\rceil.$$

Some Sample Results

The following table gives the value derived for n_{\min} for several different values of p .

p	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
n_{\min}	69	35	23	17	14	12	10	9	8	7

It is left for the experienced driver to determine, from the table, the actual probability of “road clods” driving on our highways.

¹Clod is short for “clod hopper,” a country bumpkin who has no idea what he is doing. It has come to stand for a person who is generally incompetent in a certain activity; driving on a highway in this case.

Presentation Title

Presentation Subtitle

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Date / Occasion

Outline

- 1 Introduction
 - First Subsection Name
 - Second Subsection

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Make Titles Informative. Use Uppercase Letters.

Subtitles are optional.

- Use itemize a lot.
- Use very short sentences or short phrases.

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- using the `pause` command:
 - First item.
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- using overlay specifications:
 - First item.
 - Second item.
- using the general `uncover` command:
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Summary

- The **first main message** of your talk in one or two lines.
 - The **second main message** of your talk in one or two lines.
 - Perhaps a **third message**, but not more than that.
-
- Outlook
 - Something you haven't solved.
 - Something else you haven't solved.