The lay of the land

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Why Probability and Statistics?

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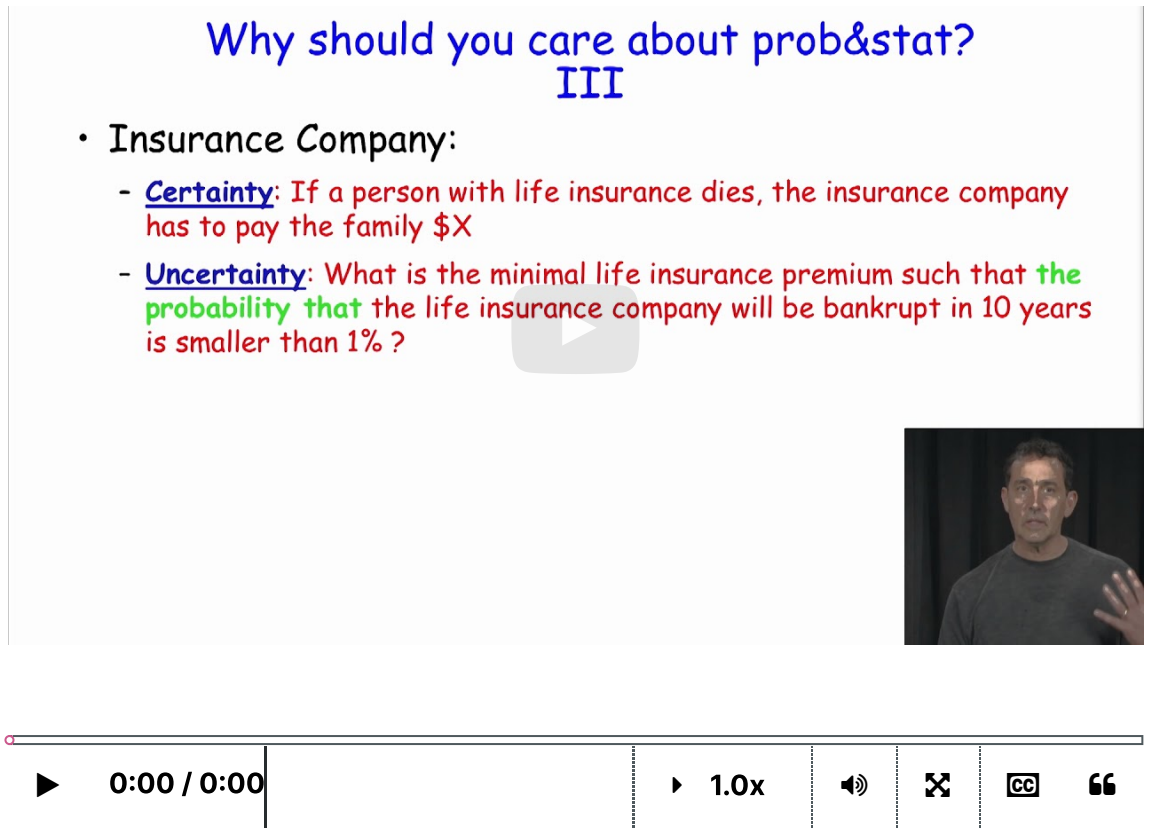

- [Yoav] Hi, my name is Yoav Fruend,

and this is Introduction to Probability and Statistics.

This is the first video,

therefore it is the introduction to Introduction to Probability and Statistics.

So we're going to talk about probability.

That is, roughly speaking, about

1.1.Introduction

POLL

Probability and statistics provide mathematical tools for estimating the likelihood of random events.

RESULTS

True	**93%**
False	**7%**

Submit

Results gathered from 136 respondents.

FEEDBACK

True. Probability and statistics help us understand, analyze, and utilize random phenomena.

1

1/1 point (graded)

Which of the following are best solved using probability and statistics?

- [x] Predicting the number of rainy days in April.
- [x] Approximating the closing price of IBM stock tomorrow.
- [x] Estimating your potential winnings in a game of Blackjack.
- [x] Guessing the winner of the next World Cup.

Explanation
All these events are uncertain, and can be addressed by various aspects of probability and statistics, some of which we will encounter in this course.

Submit Try again (1 attempt remaining)

Answers are displayed within the problem

2

1/1 point (graded)
What are probability and statistics useful for?

- [x] Quantifying uncertainty.
- [ ] Finding exact solutions to mathematical equations.
- [x] Making predictions about the future.

Explanation
- True. Just note that some random phenomena can be better quantified than others.
- False. There is no uncertainty here.
- True. Of course, the accuracy may depend on what we predict, and how far into the future.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

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Video

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- Okay.
So, in the previous video, we talked
about what is probability,
and this time we're going to talk
about what is statistics?
So, in probability theory,
we compute probabilities of
complex events,
from the underlying base

1.3.What-is-Statistics

POLL
If we flip a coin a thousand times and get 507 heads, can we conclude with certainty that the coin is unbiased?

RESULTS

Yes	**42%**
No	**58%**

Submit

Results gathered from 111 respondents.

FEEDBACK
Regardless of the bias of the coin (except when it is always heads or always tails), we can get 507 heads, hence we cannot deduce the bias with certainty. We will see how likely this outcome is later on.

1

1/1 point (graded)
In rolling a fair 6-sided die $1,200$ times, roughly how many times would you expect to see a 2?

- 200 ✓
- 600
- $1,000$
- Not enough information is given

Explanation

Explanation
The number 2 will appear in roughly one sixth of the flips, namely $1200 \times \frac{1}{6} = 200$ times.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

2

0 points possible (ungraded)
A coin is tossed 1000 times and turns up heads 700 times. Is the coin biased?

- (●) With high confidence, yes.
- ( ) Unclear.

✔

Explanation
The probability that an unbiased coin would generate 700 heads is small. Hence we can be pretty confidnet that it is biased. How confident, we will see later on.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

3

1/1 point (graded)
Which of the following describe the differences between probability and statistics?

- [x] Probability predicts what will happen. Statistics, at least in part, uses what has already happened.
- [ ] Probability requires existing data. Statistics requires underlying models.
- [ ] Probability and statistics are two words describing the same thing.

✔

Explanation
- True. Probability analyzes given models. Statistics helps us understand the what we observe.
- False. Probability requires underlying models. Statistics requires existing data.
- False. As you can see from the previous two parts, they are different.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

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A 3-card puzzle

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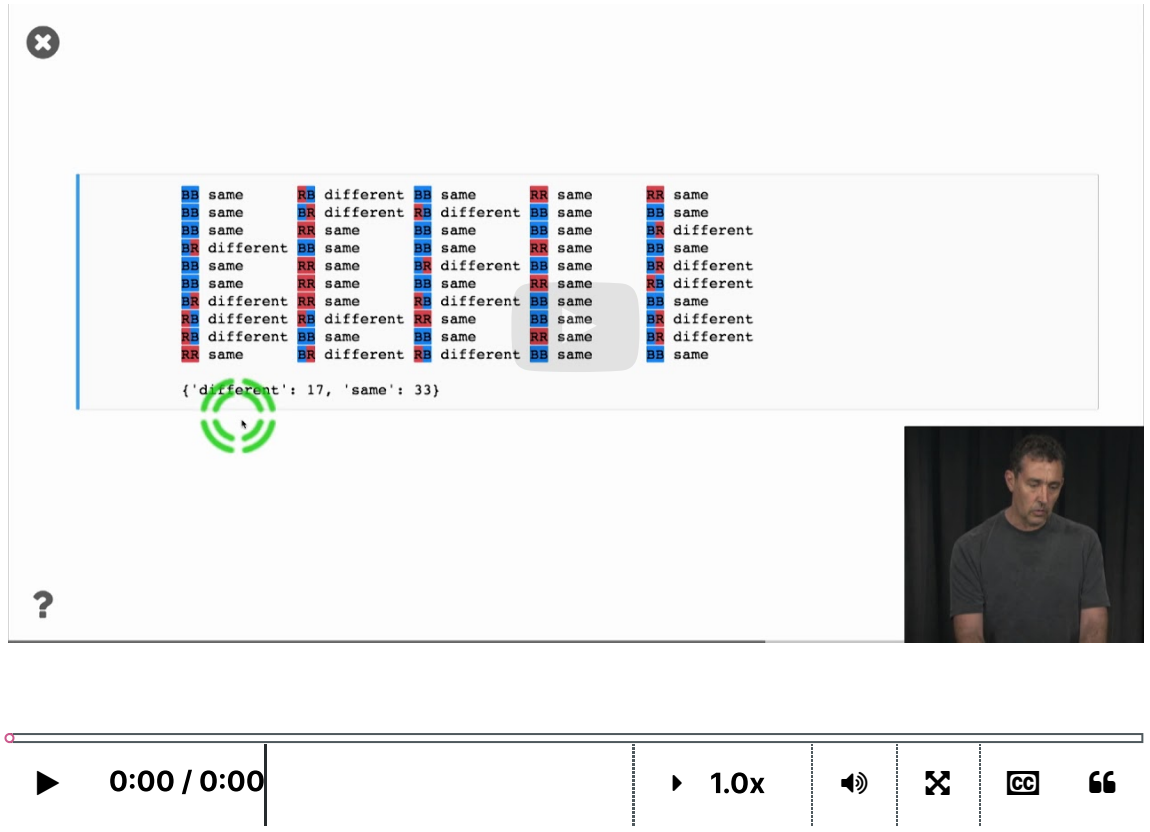

- In a previous video, I give you a short explanation

for what is probability.

And you might wonder,

"Why do I really need that, all this math?

"Does it really help me in real world situations?"

So I'm going to give you here a little puzzle,

1.4.The-Three-card-Puzzle

POLL

Why was the assumption that both players have a 50% chance of winning incorrect?

RESULTS

We never accounted for a blue side.	**0%**
We cannot know the probability until many tests are performed.	**7%**
We are more likely to pick a card with the same color on both sides.	**50%**
We didn't consider the probability of drawing a card with the same color on both sides.	**43%**

Submit

Results gathered from 98 respondents.

FEEDBACK

If we see, say a blue card, then we are twice as likely to have picked the two-blue-sides card, hence the other side is twice as likely to be blue too. We will better understand that when we study conditional probability.

1

1/1 point (graded)

What is the probability of drawing a Queen from a deck of 52 cards?

- $\frac{1}{52}$
- $\frac{4}{52}$
- $\frac{1}{2}$

$\frac{2}{52}$

Explanation
There are 4 Queens in a deck of 52 cards. The probability is $\frac{4}{52}$.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

2

1/1 point (graded)
If we repeat an experiment many times, the long-term frequencies of the outcomes converge to the probabilities.

True

False

Explanation
Ture, in fact, as we will see, probabilities are defined to model long-term frequency averages.

Submit Try again (3 attempts remaining)

Answers are displayed within the problem

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I was having trouble differentiating between the last 2 options in the poll
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