Class 2

0:00 / 46:34

Binomial Theorem

0:00 / 8:04

$$\sum_{k=3}^{n} \binom{n}{x} x^k y^n - k$$

THE PROBABILITY SET-UP

The following definition of a-field is needed to put the theolY on sound foundation. In our course, we typically take F to be set of all subsets of the sample space S so that all the conditions are automatically satisfied.

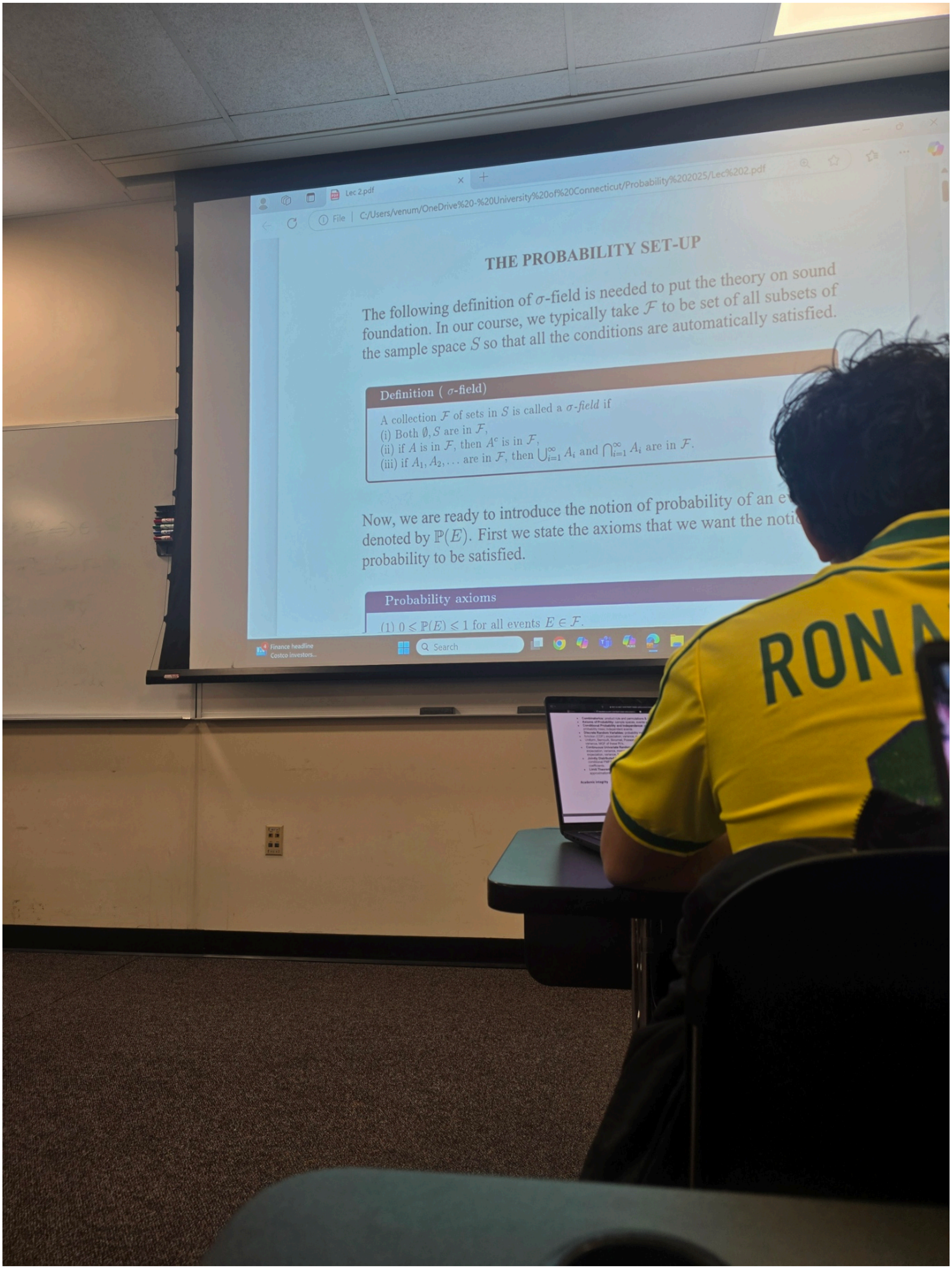
Definition (a-field) A collection F of sets in S is called a a-field if (i) Both J. S are in F,

(iii) if

. are in F, then A, and A, are in F.

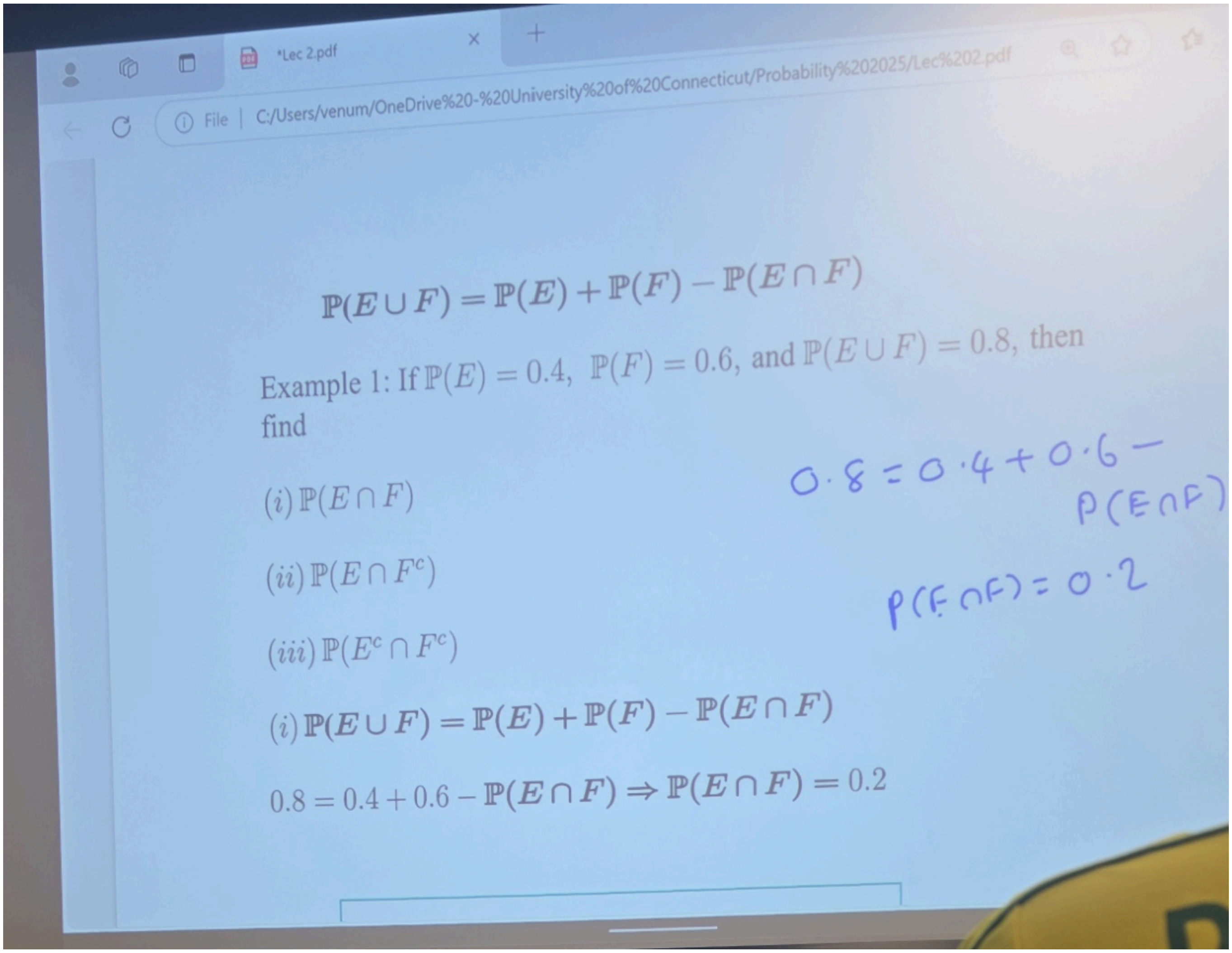
Now, we are ready to introduce the notion of probability of an e denoted by P(E). First we state the axioms that we want the noti probability to be satisfied.

Probability axioms



If two events are two events

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$



Samples spaces in which the outcomes are equally likely are called uniform sample spaces. The following is our mai toll in computing probablities of events in the uniform space

If S is a uniform sampalese and E is any event is

$$P(E) = \frac{\text{Number of outcomes in E}}{\text{Number of Outcomes in S}}$$

Example 2 Two cards are select at random from a standard deck of playing cards what is the proablity that

- they are both aces
- neither of them is an ace
- exactly one of them is an ace.
  Answers:
- $$\frac{1}{221}$$

- $$\frac{1128}{1326}$$
- $$\frac{4(48)}{1326}$$

  A group of 5 people is selected at random. What is the probability that at least two of them have the same birthday?

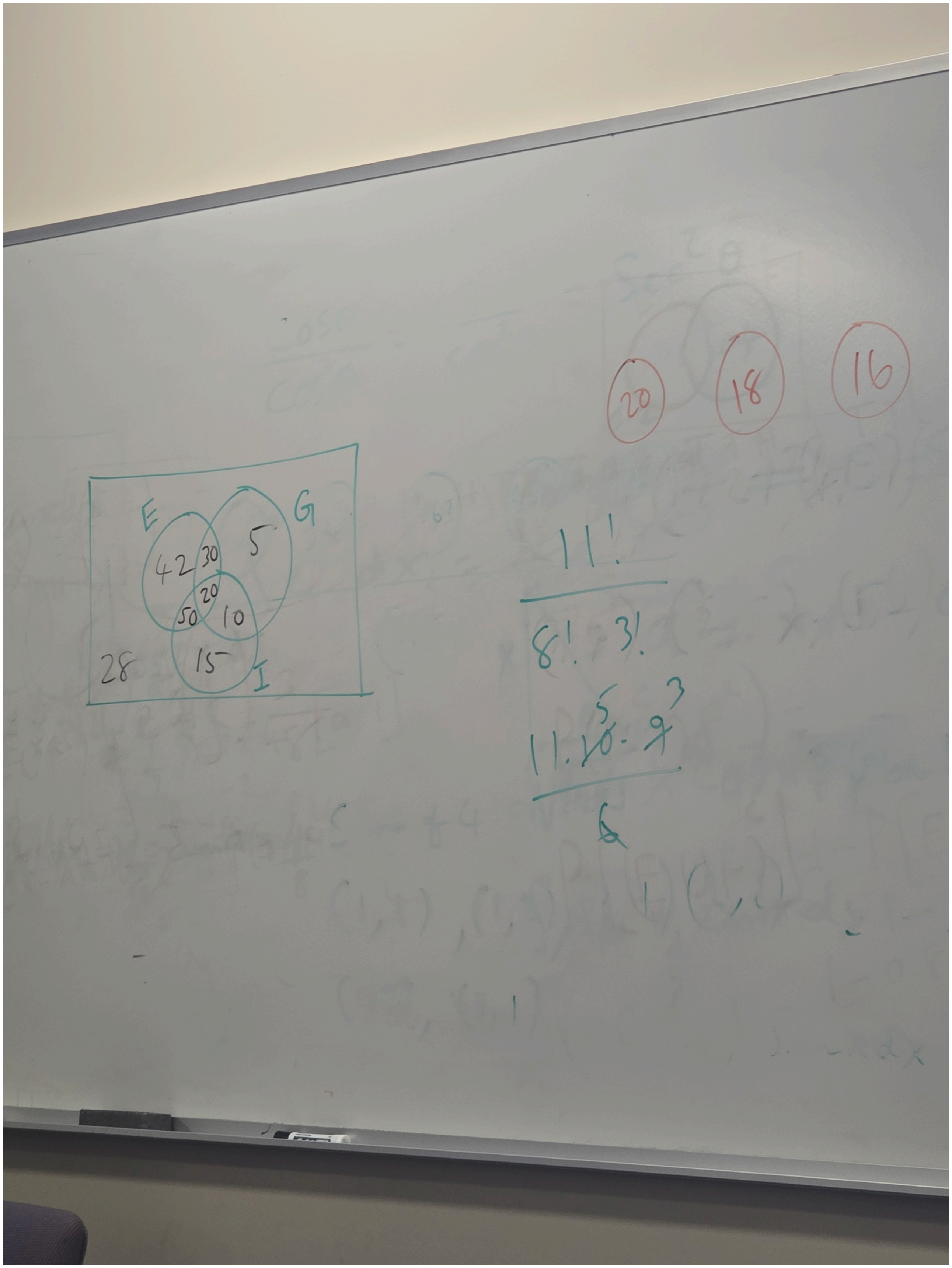
The total outcum is (365)^5

$$P(\text{at least two have same bday}) = 1 - P$$

In a survey of 200 people that just viisted Europe

- 142 visited UK
- 95 visited Italy
- 65 visited Germany
- 70 visited both UK and Italy
- 50 visited UK and Germany
- 30 visited Italy and Germany

- 20 visited all



If 3 marbles are randomly drwan from a blowl containg 6 red and 5 blue what is the proablity that one is red and two are blue.

$$n(s) = \binom{11}{3}$$

The number of ways choosing 1 red and two blues is

$$\binom{6}{1} \times \binom{5}{2}$$

Thus

$$\frac{\binom{6}{1} \times \binom{5}{2}}{\binom{11}{3}} = \frac{6 \times 10}{165} = \frac{60}{165} = \frac{4}{11}$$