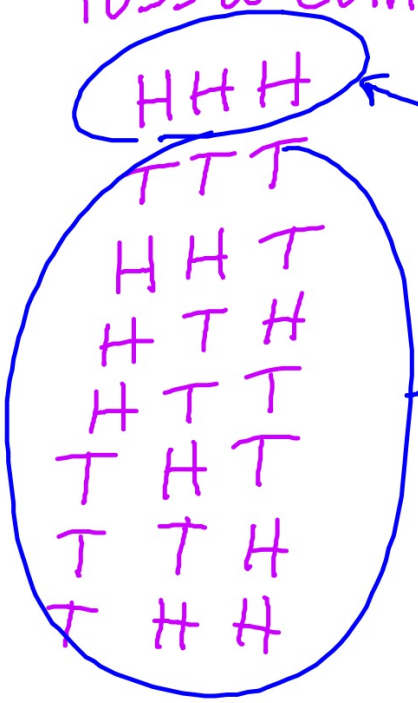
3.5 Conditional Probability Part 2

toss a coin 3 times



$P(\text{no tails}) = \frac{1}{8}$

$P(\overline{\text{no tails}}) = 1 - \frac{1}{8} = \frac{7}{8}$

$P(\text{at least 1 tail})$

The probability of "at least one" and "none" are complements!!!

P(at least one) + P(none) = 1

✳ P(at least one) = 1 - P(none)

Toss a coin 5 times. 2^5

What's the probability there are no tails?

$$P(\text{no tails}) = \left(\frac{1}{2}\right)^5 = \frac{1}{32} = .0313$$

What's the probability there is at least one tail?

$$P(\text{at least 1 tail}) = 1 - P(\text{no tails})$$

$$= 1 - \frac{1}{32}$$

$$= \frac{31}{32} \approx .969$$

4 question multiple choice quiz, 5 choices for each question.

P(none correct) $= \left(\frac{4}{5}\right)^4 = .410$

P(at least 1 correct) $= 1 - P(\text{none correct})$

$= 1 - .410$

$= .590$

Suppose 11% of the population is left handed.
30 people are randomly selected.

What's the probability that none are left handed?

$$P(\text{none left handed}) = (.89)^{30} = .0303$$

What's the probability that at least one is left handed?

$$P(\text{at least left-handed}) = 1 - P(\text{no left handed})$$

$$= 1 - (.89)^{30} = .970$$

There are 6 questions on a multiple choice quiz. There are four choices for each question. You randomly guess the answer to each question

What's the probability that none are correct?

$$P(\text{none correct}) = \left(\frac{3}{4}\right)^6$$

What's the probability that at least one is correct?

$$P(\text{at least 1 correct}) = 1 - P(\text{none correct})$$

$$= 1 - \left(\frac{3}{4}\right)^6 = .822$$

Suppose 67% of high school students trick or treat.

If I randomly select 5 students, what's the probability that at least one of them will trick or treat.

$$P(\text{none trick or treat}) = (.33)^5$$

$$P(\text{at least 1}) = 1 - (.33)^5$$