MA162: Finite mathematics

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Schedule:

- Web Assign assignment (Chapter 7.1, 7.2) due on Tuesday, November 12 by 6:00 pm.
- Web Assign assignment (Chapter 7.3) due on Friday, November 15 by 6:00 pm.
- Exam 3 on Monday, November 25, 5:00 pm to 7:00 pm.

Today is Chapter 7.3. We learn some general techniques for computing probabilities

7.3: Some Rules for Computing Probabilities

- $0 \leq P(E) \leq 1$ for any event E
- $P(S) = 1$ where S is the entire sample space
- $P(E \cup F) = P(E) + P(F) - P(E \cap F)$
- Notice that if E and F are mutually exclusive, then

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

- $P(E^c) = 1 - P(E)$
- For any two events E and F,

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

7.3: Dice

A pair of fair 6 sided dice is rolled.

- Determine the probability that one die turns up a number not greater than 3 and the other die turns up a number greater than 4.

- Determine the probability that one die turns up a number not greater than 3 and one die turns up an even number.

- Determine the probability that the sum of the values of the dice is at least 8.

7.3: Flipping coins

A fair coin is flipped 5 times.

- What is the probability of turning up exactly two heads?

- What is the probability of turning up at least two heads?

7.3: Drawing Cards

Two cards are drawn from a standard deck of 52 cards.

- What is the probability the two cards have the same suit?
- What is the probability that one card has a number between 3 and 7?
- What is the probability that the two card hand contains a King and a Spade?
- What is the probability that the two card hand contains a King or a spade?

7.3: Another Probability Rule

- E is an event
- $F_1, F_2, \ldots, F_r$ are events satisfying
  - $S = F_1 \cup F_2 \cup \cdots \cup F_r$
  - Each pair F_i and F_j are mutually exclusive, for $i \neq j$
- Then $P(E) = P(E \cap F_1) + P(E \cap F_2) + \cdots + P(E \cap F_r)$

7.3: More dice

A six sided die is rolled 4 times. What is the probability of rolling at least one six?

7.3: Gaming

- A group of 243 video gamers were asked about video game habits.
- Question 1: Which game consoles do you own? "Own PS 3", "Own X-Box 360", "Own neither", "Own both"
- Question 2: How many hours per week do you play? "no more than 2 hours", "between 2 to 6 hours", "more than 6 hours"
- Results are recorded on next page

7.3: Gaming

	PS 3 only	X-Box only	Both	Neither	Total
$<$ 2 hours	47	23	7	17	94
2 to 6 hours	34	41	11	3	89
$>$ 6 hours	15	18	25	2	60
total	96	82	43	22	243

- Probability random gamer owns an X-box but not a PS-3?
- Probability random gamer owns a PS-3?
- Probability random gamer plays at least 2 hours per week?
- Probability random gamer owns an X-box and plays two hours or less per week?

Conditional Gaming

	PS 3 only	X-Box only	Both	Neither	Total
$<$ 2 hours	47	23	7	17	94
2 to 6 hours	34	41	11	3	89
$>$ 6 hours	15	18	25	2	60
total	96	82	43	22	243

- Restrict attention only to gamers who own both consoles. What is probability they play at least two hours per week?

- Restrict attention to gamers who play less than two hours per week. What is probability they own a PS 3?