MA162: Finite mathematics

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April 13, 2011

SCHEDULE:

- HW D1 is due Monday, Apr 18th, 2011.
- HW D2 is due Monday, Apr 25th, 2011.
- HW D3 is due **Friday, Apr 29**, 2011.
- Final Exam is Wednesday, May 4th, 6:00pm-8:00pm

Today we will cover 7.1: Sample spaces

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- If you flip a coin once, it will be heads or tails, but who knows which?
- If you flip a coin 1000 times, it will be heads between 450 and 550 times (with a 99.9% probability).

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- Some things you observe are quite reproducible: when you flip a coin it lands on heads or tails, and each happens about 50% of the time
- An **experiment** is a planned observation of life whose goal is (usually) to confirm a reproducible result
- For example, we might plan an experiment where we flip 10 coins and count how many heads show up.

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- A **sample space** is a list of all the possible outcomes of an experiment
- If we pull one card from the deck, then our sample space can be the set of all 52 (or 54) cards in the deck.
- If we draw five cards from the deck and don't care about order, then there are $\frac{52}{5}\frac{51}{4}\frac{50}{3}\frac{49}{2}\frac{48}{1} = 2,598,960$ possible outcomes

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- Mhtt $= \{HHH, HHT, HTH, THH\}$ has four sample points in it

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- Two events are **mutually exclusive** if their intersection is empty; that is, it is not possible for both to happen at the same time.
- Not all events are mutually exclusive.
- For instance the event "get a head on the very first try!" is $\{HHH, HHT, HTH, HTT\}$ and so the intersection with "more heads than tails" is $\{HHH, HHT, HTH\}$

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5. (STA291) After actually running the experiment, decide whether your probability calculation reflects reality
6. (STAxxx) Decide how many times to run the experiment before you can decide whether your probability calculation reflected reality

Summary

- We learned the words **experiment**, **sample space**, **event**, and **mutually exclusive**
- HWD1 will ask you to write out events; you can do HWD1 tonight
- HWD2 and HWD3 are due the same week, and finals are soon; do not delay
- Thursday we will cover 7.2: Probability