Slide 1

Administrivia

- None really.

Slide 2

Permutations

- We might want to know how many ways we can choose an ordered sequence of r objects, chosen from n possibilities with no repeats. Call this $P(n, r)$.

  Example: How many 7-digit phone numbers have no repeated digits?
- Can we come up with a general formula? (Of course. Let's derive one.)
- Look at some boundary cases — $r = n$, $r = 0$. What if $r > n$? (Does this even make sense?)

Combinations

Slide 3

- Or we might want to know how many ways we can choose an *unordered* collection of r objects, chosen from n possibilities with no repeats. Call this $C(n, r)$.

  Example: How many ways can we draw 5 cards from a deck of 52?
- Can we come up with a general formula? (Of course. Let's derive one.)
- Again look at some boundary cases — $r = n$, $r = 1$, $r = 0$. What if $r > n$? (Does this even make sense?)
- Aside: Another common notation for this is $\binom{n}{r}$ ("n choose r").

Permutations Versus Combinations

Slide 4

- In general: If order matters, it's a permutation; if order doesn't matter, it's a combination.
- Example: How many different "hands" of 5 cards can we select from a deck of 52 cards?
- Example: section 3.4 problem 51.

Potential Pitfall — Counting Things Twice

- A problem is that some proposed solutions sound reasonable but actually manage to count some things twice, or don't count some things at all.
- Example: example 55 part (d).

Slide 5

Minute Essay

- Given 20 words, how many 6-word phrases can you make up, if no repeated words are allowed? ("refrigerator magnet poetry")
  Okay to express answers in terms of $P(n, r)$ and/or $C(n, r)$ or factorials.
- A standard 52-card deck contains 12 face cards (kings, queens, jacks). How many 5-card "hands" (order doesn't matter) consist only of face cards?

Slide 6