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Review

- Probability

Always Sample Space? (Think Big)

2 Problems

- Probability of Event
  - Yes: All events equally likely → $Pr(E) = \frac{|E|}{|S|}$
  - No → $Pr(E) = \sum_{i \in E} Pr(i)$
- Expected value of random variable
  - No: Given $Pr(i)$ $\forall i \in S$?
    - Linearity of Expectation Procedure:
      $X = \sum_E X_E$
      $E[X] = \sum_E E[X_E]$
      $E[X] = \sum_E Pr(E)$
  - Yes → $E[X] = \sum_{i \in S} Pr(i) X(i)$

English to Math

Usually need to introduce a new object using $\forall, \exists$.
Usually only a limited number of possible new objects.

For example, Graph objects:

	edge	vertex	set of edges	set of vertices
undirected	$\{u,v\} \in E$	$v \in V$	$A \subseteq E$	$B \subseteq V$
directed	$(u,v) \in E$			

Watch out for type mismatches:

$A \cap B$ A, B must both be sets

$A \subseteq B$ " "

$A \wedge B$ A, B must both be booleans or predicates

Recurrence Relations

- Master Method: need to be able to identify when it can be used, and apply... will not need to prove
- Iterative Method

1. Keep track of level of substitution

$k=1$ $T(n) = T(n-1) + 1$

$k=2$ $T(n) = [T(n-2)+1] + 1 = T(n-2) + 2$

$k=3$ $T(n) = [T(n-3)+1] + 2 = T(n-3) + 3$

2. Look for pattern in terms of k

$$T(n) = T(n-k) + k$$

3. Write k in terms of n to make $T(\cdot) = T(1)$

$$k = n-1 \Rightarrow T(n) = T(1) + n - k$$

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4. Plug in base case.

Counting

How many n-bit strings contain K blahs

$\binom{n}{k} \cdot \square \cdot \square$

↑ position of blahs

↑ choices for blahs

↑ choices for non-blah positions

See midterm solutions on my door...