

CS 305
Design and Analysis of Algorithms

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Today's Topics

- Questions / Comments?
- Apply indicator random variables to analyze the expected running time of Randomized Quicksort
- Decision trees
- Lower bound running time on comparison sorts

Expected Value and Indicator Random Variables

Expected Value $E[.]$

X , X_1 and X_2 are random variables

$$X = X_1 + X_2$$

$$E[X] = E[X_1] + E[X_2]$$

$E[cX] = cE[X]$, where c is a constant scalar

Indicator Random Variable X_A

S is sample space, A is an Event

$X_A = 1$ if A occurs, 0 if A doesn't occur

$E[X_A] = P(A)$ the probability that A occurs