Cumulative Probabilities

The random variable $X \sim B(20, 0.4)$. Find:

$P(X \leq 7) =$
$P(X < 6) =$
$P(X \geq 15) =$

Look up $n = 20, p = 0.4, x = 7$

Note that the table requires ≤

To get this right, just say in your head "*What's the opposite of 'at least 15'*?". Hopefully you can see it's '*at most 14*'.

Given that $X \sim B(25, 0.25)$

$P(X = 6) =$

$P(X > 20) =$
$P(6 < X \leq 10) =$

X can be 7 to 10. So we want up to 10, with everything up to 6 excluded.

Quickfire Questions

Write the following in terms of cumulative probabilities, e.g. $P(X < 7) = P(X \leq 6)$

$P(X < 5) =$
$P(X \geq 7) =$
$P(X > 7) =$
$P(10 \leq X < 20) =$

$P(10 \leq X \leq 20) =$
$P(X = 100) =$
$P(20 < X < 30) =$
"at least 30" =
"greater than 30" =

Dealing with Probability Ranges

Q

A spinner is designed so that probability it lands on red is 0.3. Jane has 12 spins.

a) Find the probability that Jane obtains at least 5 reds.

Jane decides to use this spinner for a class competition. She wants the probability of winning a prize to be < 0.05. Each member of the class will have 12 spins and the number of reds will be recorded.

b) Find how many reds are needed to win the prize.

Q

At Camford University, students have 20 exams at the end of the year. All students pass each individual exam with probability 0.45. Students are only allowed to continue into the next year if they pass some minimum of exams out of the 20.

What do the university administrators set this minimum number such that the probability of continuing to next year is at least 90%?

Textbook Exercise 6C Pg 93