MIT Introduction to Statistics 18.05 Reading 4 - Questions

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Contents

1 References and License

We are answering questions in the material from MIT OpenCourseWare course 18.05, Introduction to Probability and Statistics.
Please see the references section for detailed citation information.
The material for the course is licensed under the terms at `http://ocw.mit.edu/terms`.
We are answering the questions that Orloff and Bloom ask in [4].
We use documentation in [5], [1], and [2] to write LaTeXsource code of this document.

2 Problem 1

2.1 Probability Of A Given Value of a Random Variable

The probability mass functions for all events must sum to one, therefore the probability that $X = 20$ is $\frac{1}{2}$.

2.2 Value of a Cumulative Distribution Function for a Given number

$F(17)$ is the sum of the probability mass functions for values of X that are less than or equal to 17. Hence $F(17) = \frac{2}{10} + \frac{1}{10} + \frac{2}{10} = \frac{1}{2}$.

2.3 Value of a Cumulative Distribution Function for another Given number

$F(20)$ is the sum of the probability mass functions for values of X that are less than or equal to 20. Hence $F(20) = \frac{2}{10} + \frac{1}{10} + \frac{2}{10} + \frac{1}{2} = 1$.

2.4 Value of a Cumulative Distribution Function

$F(25)$ is the sum of the probability mass functions for values of X that are less than or equal to 25. Hence $F(25) = \frac{2}{10} + \frac{1}{10} + \frac{2}{10} + \frac{1}{2} = 1$.

2.5 Problem 2

Orloff and Bloom ask for the probability mass function for the event $P(X = 3)$ where X follows the binomial distribution binomial $\left(6, \frac{1}{2}\right)$.
We use the probability mass function that Orloff and Bloom give in section 3.2 of [3] for the case where $n = 6$, $p = \frac{1}{2}$ and $k = 3$.
Therefore the probability mass function is:

$$p(3) = \binom{6}{3}\left(\frac{1}{2}\right)^{3}\left(\frac{1}{2}\right)^{(6-3)} = \frac{20}{64} = 0.3125 \tag{1}$$

References

[1] StackExchange User Peter Grill. *How to make the limit (mathematics) sign? Answer*. Ed. by StakExchange User kiss my armpit. Available at `http://tex.stackexchange.com/questions/74969/how-to-make-the-limit-mathematics-sign`(2012/10/2).

[2] oeis.org. *List of LaTeX mathematical symbols*. Available at `https://oeis.org/wiki/List_of_LaTeX_mathematical_symbols`(2015/5/31).

[3] Jeremy Orloff and Jonathan Bloom. *Discrete Random Variables Class 4, 18.05, Spring 2014 Jeremy Orloff and Jonathan Bloom*. Available at `https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/readings/MIT18_05S14_Reading4a.pdf` (Spring 2014).

[4] Jeremy Orloff and Jonathan Bloom. *Reading Questions 4a*. Available at `https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/readings/reading-questions-4a/` (Spring 2014).

[5] Scott Pakin. *The Comprehensive Latex Symbol List.* Available at `https://math.uoregon.edu/wp-content/uploads/2014/12/compsymb-1qyb3zd.pdf`(2002/10/8).