

Homework 2: due Friday August 13

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Please show all steps in your solutions to the following questions:

1. Consider the following joint probability table between $X \in \{0, 1\}$ and $Y \in \{-1, 0, 1\}$:

		x	
	$P(x, y)$	0	1
y	-1	1/12	1/4
	0	1/4	1/12
	1	1/6	1/6

- (a) Compute $P(Y = 0|X = 1)$.
 (b) Compute $\text{Var}[Y]$.
2. Let X be a continuous variable with the density function:

$$f(x) = \begin{cases} \frac{1}{\log 4} \left(\frac{1}{x+1} \right) & 0 \leq x \leq 3, \\ 0 & \text{otherwise.} \end{cases}$$

- (a) Verify that $f(x)$ is a probability density function.
 (b) Compute $E[X]$ (Hint: use $\frac{x}{x+1} = 1 - \frac{1}{x+1}$).
3. Suppose that the average loading time of your laptop is 15 seconds. What is the probability that the next loading time of your laptop is between 9 and 12 seconds?
4. A new movie *rise of the squirrels* has come out this week. The Box Office reports that, on average, a ticket is bought every 10 minutes. Suppose that the next showtime of this movie is in the next three hours. What is the probability that 20 persons has bought the ticket before then?
5. Let $X \sim \text{Exp}(\lambda)$. Compute the cumulative distribution function of X .