

BUEC 333: Some Answers to Study Questions for the Midterm

1. Construct the pdf and cdf for the sum of 3 dice. Using the cdf, show the probability of getting a sum in the range of [6,8]. pdf and cdf in 216'ths.

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|--|---|---|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | 1 | 3 | 6 | 10 | 15 | 21 | 25 | 27 | 27 | 25 | 21 | 15 | 10 | 6 | 3 | 1 |
| | 1 | 4 | 10 | 20 | 35 | 56 | 81 | 108 | 135 | 160 | 181 | 196 | 206 | 212 | 215 | 216 |

2. Construct the pdf and cdf for the sum of 4 coin flips (0,1). Using the cdf, show the probability of getting at least 3 heads. expressed in 16'ths. $P[\text{sum} \geq 3] = 5/16$.

| | | | | | |
|-----|---|---|----|----|----|
| | 0 | 1 | 2 | 3 | 4 |
| Pdf | 1 | 4 | 6 | 4 | 1 |
| cdf | 1 | 5 | 11 | 15 | 16 |

3. Consider a discrete random variable Y whose pdf is given by the table:

| | | | | | |
|--------------|-------|-------|-------|-------|-------|
| range: | -2 | -1 | 0 | 1 | 2 |
| probability: | 0.067 | 0.242 | 0.382 | 0.242 | 0.067 |

This discrete random variable was created by discretizing the standard normal into ranges (less than -1.5), (-1.5 to -0.5), (-0.5 to 0.5), (0.5 to 1.5) and (1.5 and up), and assigning values -2,-1,0,1 and 2.

What is the pdf and cdf for the $W=2Y+3$?

| | | | | | |
|-----|-------|-------|-------|-------|-------|
| | -1 | 1 | 3 | 5 | 7 |
| Pdf | 0.067 | 0.242 | 0.382 | 0.242 | 0.067 |
| cdf | 0.067 | 0.309 | 0.691 | 0.933 | 1 |

What is $E[W]$ and $Var[W]$? $E[W]=3$; $V[W]= 4.08$.

What is the pdf and cdf for $V=Y*Y$?

| | | | |
|------|-------|-------|-------|
| | 0 | 1 | 4 |
| pdf: | 0.382 | 0.484 | 0.134 |

What is $E[V]$ and $Var[V]$? 1.02 and 1.588

4. Consider a 100 observations of a random variable distributed $N(4,1600)$.
 - a. What is the distribution of the average of those 100 observations? (That is, what is the sampling distribution of a statistic equal to the sample mean?)
 - i. $N(4,16)$
 - b. What is the probability that the true value of the population mean is 0, but we just happened to draw a sample whose average is 4 or more?
 - i. 0.159
 - c. What is the 80% confidence interval for the true mean of the variable in the population?
 - i. -1.12 to 9.12