

No. Chapter 4, Section A

1 Find the mean of the random variable representing the total of 3 coins: dimes and nickels.

\underline{x}	$\underline{f(x)}$	=	19
10	0.3		
20	0.5		
30	0.2		
	sum =		

2 Find the average if the probability distr of X is:

x	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Sum</u>	$\bar{x} =$	3.05
$f(x)$	0.10	0.20	0.35	0.25	0.10			

3 What is the expected profit from investing stock with the following distribution of earnings:

\underline{x}	$\underline{f(x)}$		490
100	0.2		
400	0.5		
900	0.3		

- 4 The payoff in gambling is \$3 for a jack or queen and \$5 for a king or ace.
What value of y will make this a break-even bet?

Event	Amt Won	$f(x)$
Jack or Queen	$3-y$	$8/52$
King or Ace	$5-y$	$8/52$
other	$-y$	$36/52$

1.23

- 5 An airplane is insured for \$200000. How much premium is needed to make a profit of \$500 given the possible annual payouts below?

	x	$f(x)$
no loss	0	90%
total loss	210000	1%
mild partial loss	16000	3%
heavy partial loss	50000	6%

premium required = Average Loss + Profit

6 Find expected value of X for density function:

$$f(x) = \begin{cases} \frac{4}{\pi(1+x^2)} & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Hint: u du problem

44%

7 Given the following density function, what is the average value of x ?

$$f(x) = \begin{cases} x & 0 < x < 1 \\ 2 - x & 1 \leq x < 2 \\ 0 & \textit{elsewhere} \end{cases}$$

100 hrs/yr

8 X = random variable with following probability distribution:

x	-1	0	1
$f(x)$	0.36	0.50	0.14

Find $u_{m(x)}$, where $m(X) = (2X+5)^2$

22.6

9 X = word processors purchased

How much expect to spend on average for new ones given a cost function $m(x)$ below:

$$\text{Cost} = m(x) = 400 X + 150$$

x	0	1	2	3
$f(x)$	0.20	0.35	0.40	0.05

10 Profit = $m(X) = 500 X^2$

\$83.33

Where X is a random number with prob frequency of:

$$f(x) = \begin{cases} 2(1-x) & 0 < x < 1 \\ 0 & \textit{elsewhere} \end{cases}$$

Compute the mean profit:

11 X and Y have the following joint prob distribution:

		x	
		3	4
y	1	14%	15%
	3	18%	28%
	5	10%	15%

a) Find μ_x and μ_y

2.92

b) Find expected value of $d(X,Y) = XY^2$

38.5

12 Referring to the joint distr below, find the mean for the total number of jacks and kings when the 3 cards are draw without replacement from 12 face cards.

Extra

		x			
		0	1	2	3
y	0	0.02	0.11	0.11	0.02
	1	0.11	0.29	0.11	
	2	0.11	0.11		
	3	0.02			

x+y			
1	2	3	
1	2	3	4
2	3	4	5
3	4	5	6

$$\mu_{X+Y} = \sum_0^3 \sum_0^3 (x+y) f(x,y)$$

(x+y)*f(x,y)			
0	0.11	0.22	0.05
0.11	0.58	0.33	
0.22	0.33		
0.05			

13 (X,Y) are uniformly distributed on a circle with radius a. Joint prob distribution is:
distributions of the random variables X and Y:

Extra

$$f(x, y) = \begin{cases} \frac{1}{\lambda a^2} & x^2 + y^2 \leq a^2 \\ 0 & \text{elsewhere} \end{cases}$$

What is the expected value of X, μ_x ?

$$\begin{aligned} E(X) = \mu_x &= \int_{-a}^a \int_{-\sqrt{a^2-y^2}}^{\sqrt{a^2-y^2}} \left(\frac{1}{\lambda a^2} \right) x \, dx dy \\ &= \left(\frac{1}{\lambda a^2} \right) \int_{-a}^a \int_{-\sqrt{a^2-y^2}}^{\sqrt{a^2-y^2}} x \, dx dy \\ &= \left(\frac{1}{2\lambda a^2} \right) \int_{-a}^a x^2 dy \Bigg|_{-\sqrt{a^2-y^2}}^{\sqrt{a^2-y^2}} \\ &= \left(\frac{1}{2\lambda a^2} \right) \int_{-a}^a [(a^2 - y^2) - (a^2 - y^2)] dy \\ &= \left(\frac{1}{2\lambda a^2} \right) \int_{-a}^a 0 \, dy = 0 \end{aligned}$$