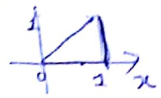
ANSWERS CT314 1st Insem 2015

Q1. (a) $\{v : -\infty < v < \infty\} = (-\infty, \infty)$

(b) $\{(x,y) : 0 \le y \le x \le 1\}$ → 

(c) $\{(1,b),(2,b),(3,w),(4,w)\}$

(d) $\{0, 1, 2, 3\}$

4

Q2. $P(A_1(A_2+A_3)) = P(A_1A_2 + A_2A_3) = P(A_1A_2) + P(A_2A_3) - P(A_1A_2A_3)$

$= P(A_1)P(A_2) + P(A_2)P(A_3) - P(A_1)P(A_2A_3)$

$= P(A_1)\left[P(A_2) + P(A_3) - P(A_2A_3)\right]$

$= P(A_1)P(A_2+A_3)$ So A_1 and A_2+A_3 are independent

2

Q3. (a) A RV is a function or transformation that maps experimental space to real line

$X : S \to R$, the domain consists of set of all outcomes and the range is all real numbers.

(b) Condition: 2) Distribution functions (CDF/PDF) should exist i.e. for any real x $\{s : X(s) \le x\}$ should be an event in the sample space with some assigned probability.

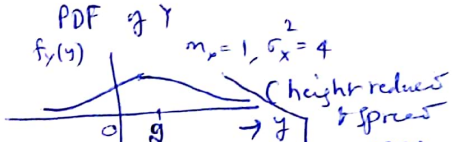
2

Q4. $Y = 2X + 2$

PDF of X

$f_x(x) = \frac{1}{\sqrt{2\pi}\cdot 1} e^{-x^2/2}$ for all x

PDF of Y

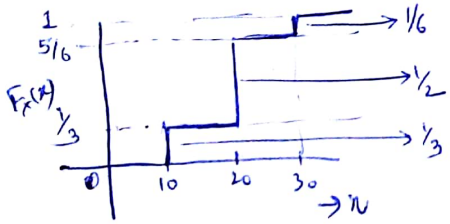


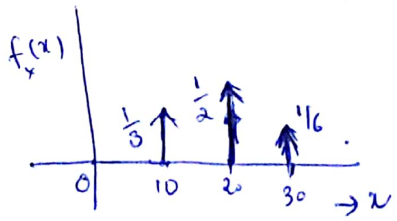
$f_y(y) = \frac{1}{\sqrt{2\pi}\cdot 4} e^{-\frac{(y-2)^2}{2\cdot 4}}$ for all y

$1 + \frac{1}{2} + 1 = 5$

$+\frac{1}{2} + 1$

Q5.

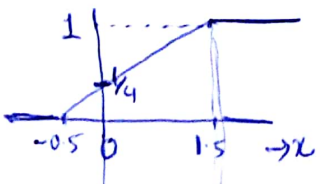




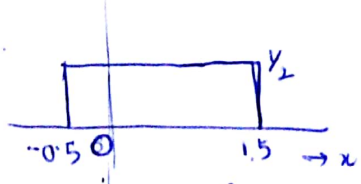
3

Q6.

CDF of $X = F_x(x) = P(X \le x)$



PDF of $X = f_x(x)$

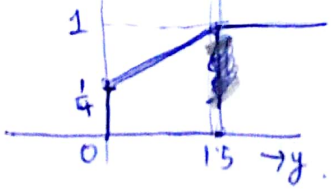


$1 + 1.5 + 1.5$

$\downarrow$

$.5 \cup .5$

CDF of $Y = F_y(y)$



PDF of $Y = f_y(y)$