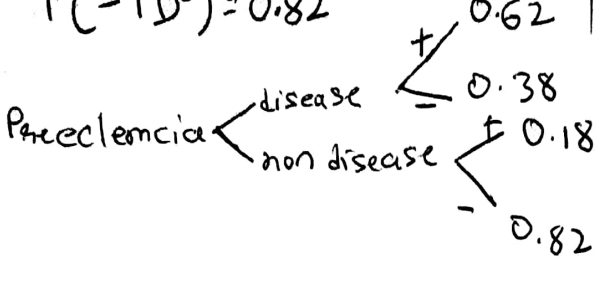
HOME WORK-2

1. $P(+|D) = 0.62$

$P(-|D^c) = 0.82$



(a) $P(+|D^c)$

$= \frac{P(+ \cap D^c)}{P(D^c)}$

$= 1 - P(-|D^c)$

$= 1 - 0.82$

$= 0.18$

(b) $P(-|D)$

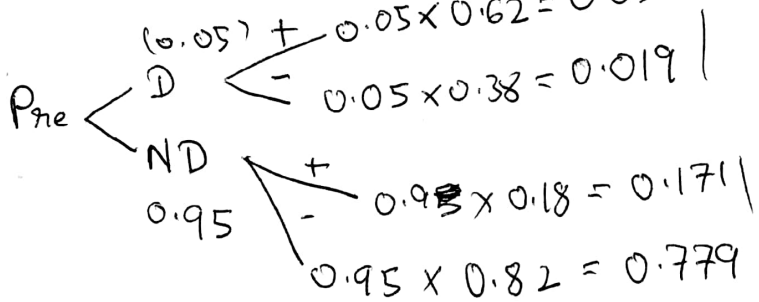
$= 1 - P(+|D)$

$= 1 - 0.62$

$= 0.38$

(c) $P(D) = 0.05$

$P(D^c) = 0.95$



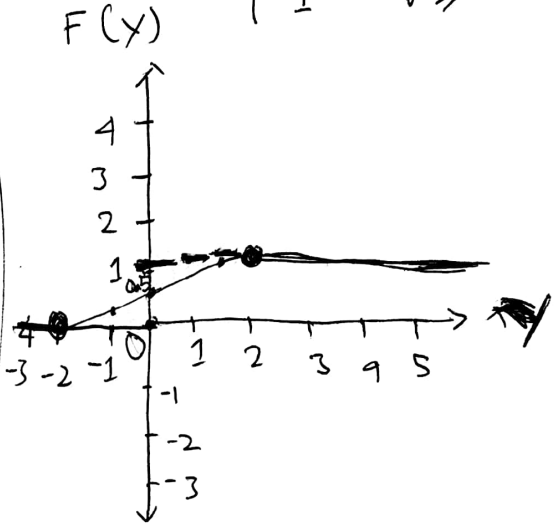
(d) $P(+) = P(+ \cap D) + P(+ \cap D^c)$

$= 0.031 + 0.171$

(e) $\frac{P(+ \cap D)}{P(+)}$

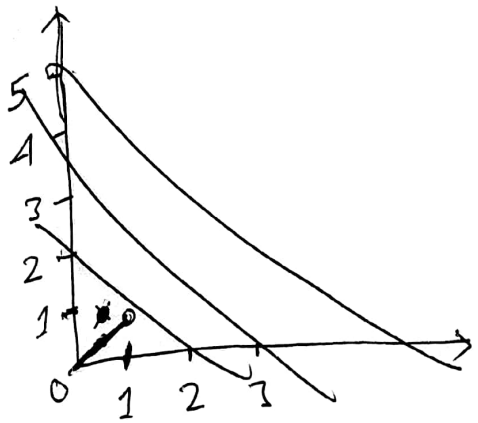
$= \frac{0.031}{0.202} = 0.15346$

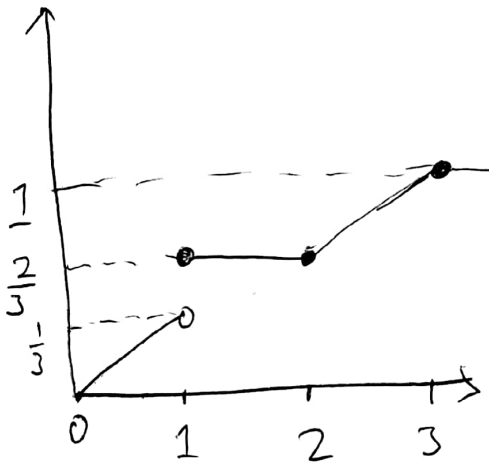
2(a) $F(y) = \begin{cases} 0 & y < -2 \\ \frac{y+2}{4} & -2 \le y < 2 \\ 1 & y \ge 2 \end{cases}$



(b) $F(y) = \begin{cases} 0, & y < 2 \\ 0.5, & 2 \le y < 3 \\ 1, & y \ge 3 \end{cases}$

3. $F(y) = \begin{cases} 0, & y \le 0 \\ y/3, & y \in [0,1) \\ 2/3, & y \in [1,2] \\ y/3, & y \in [2,3] \\ 1, & y \ge 3 \end{cases}$





(a) $P(X > 0.5)$

$= 1 - P(X \le 0.5)$

$= 1 - \left(\frac{0.5}{3}\right)$

$= \left(\frac{3 - 0.5}{3}\right)$

$= \frac{2.5}{3}$

$= 0.833$

(b) $P(2 < X \le 3)$

$= P(X \le 3) - P(X \le 2)$

$= 1 - \frac{2}{3}$

$= \frac{1}{3}$

(c) $P(0.5 < X \le 2.5)$

$= P(X \le 2.5) - P(X \le 0.5)$

$= \frac{2.5}{3} - \frac{0.5}{3}$

$= \frac{2}{3}$

(d) $P(X = 1)$

$= P(X \le 1) - P(X < 1)$

$= \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

4. (4.5.2)

$P(X = x) = (7 - x)/20$

for $x = 1,2,3,4,5$

$P(X = 6) = 0$

(e)

$P(X = x) = \begin{cases} \frac{(7-x)}{20}, & x = 1,2,3,4,5 \\ 0 & x = 6 \end{cases}$

Therefore PMF is-

$P(x) = \begin{cases} 6/20, & x = 1 \\ 5/20, & x = 2 \\ 4/20, & x = 3 \\ 3/20, & x = 4 \\ 2/20, & x = 5 \\ 0, & \text{otherwise} \end{cases}$

(b) $P(1) = \frac{6}{20}$

$P(2) = \frac{5}{20}$

$P(3) = \frac{4}{20}$

$P(4) = \frac{3}{20}$

$P(5) = \frac{2}{20}$

$P(6) = 0$

$= \frac{6}{20} \times (-1.5) + \frac{5}{20} \times (0.5)^2$

$+ \frac{4}{20} \times (0.5)^2 + \frac{3}{20} \times (1.5)^2$

$+ \frac{2}{20} \times (2.5)^2$

$= 1.75$

(e) $SD = \sqrt{Var(X)}$

$= \sqrt{1.75} = 1.322$

The CDF of X is -

$$F(x) = \begin{cases} 0 & \text{for } x < 1 \\ 6/20, & 1 \le x < 2 \\ 11/20, & 2 \le x < 3 \\ 15/20, & 3 \le x < 4 \\ 18/20, & 4 \le x < 5 \\ 1, & 5 \le x \end{cases}$$

(c) $E(X) = 1 \times \frac{6}{20} + 2 \times \frac{5}{20}$

$+ 3 \times \frac{4}{20} + 4 \times \frac{3}{20}$

$+ 5 \times \frac{2}{20} + 6 \times 0$

$= \frac{6}{20} + \frac{10}{20} + \frac{12}{20} + \frac{12}{20} + \frac{10}{20}$

$= \frac{50}{20} = 2.5$

(d) $Var(X) = \sum (x - M)^2 f(x)$

$= \frac{6}{20} \times (1 - 2.5)^2$

$+ \frac{5}{20} \times (2 - 2.5)^2$

$+ \frac{4}{20} \times (3 - 2.5)^2$

$+ \frac{3}{20} \times (4 - 2.5)^2$

$+ \frac{2}{20} \times (5 - 2.5)^2$