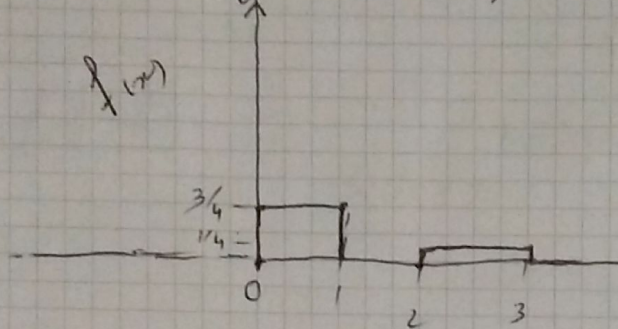Topic :   Cont's Random variable

5.1

Let X be a Cont's random variable with P.D.F

$$f(x) = \begin{cases} 3/4 & \text{for } 0 \le x \le 1 \\ 1/4 & \text{for } 2 \le x \le 3 \\ 0 & \text{elsewhere.} \end{cases}$$

a) Draw the graph of f

(Graph of f)

b) Determine the distribution function
       F of X, and draw its graph

$$F(x) = \int_{-\infty}^{+\infty} f(x)\, dx \quad — (A)$$

We know that

Here it's a piecewise function, so

$F(x) = \int_{-\infty}^{x} f(x) dx$

$F(x) = \int_{0}^{1} (\frac{3}{4}) dx + \int_{2}^{3} (\frac{1}{4}) dx$

$F(x) = \frac{3}{4} \int_{0}^{1} 1 \cdot dx + \frac{1}{4} \int_{2}^{3} 1 \cdot dx$

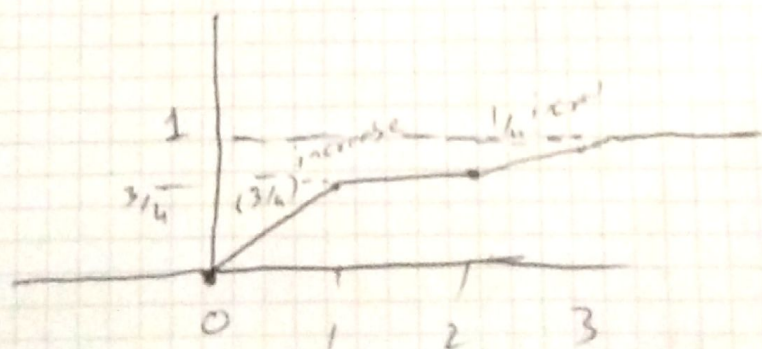$= \frac{3}{4} \left\{ x \Big|_{0}^{1} \right\} + \frac{1}{4} \left\{ x \Big|_{2}^{3} \right\}$

$\Rightarrow \frac{3}{4} (1-0) + \frac{1}{4} (3-2)$

$\Rightarrow 1$

so

① $\quad F(x) = 1 \quad$ for $\quad x > 3$

② $\quad F(x) = 0 \quad$ for $\quad x < 0$

The graph of distribution function

③ $F(x)$ is non-decreasing function

b/w 0 and 3