Quantitative Methods & Simulation

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ACTIVITY 02 - CALCULATE CDF AND E(X)

$$f(x) = \begin{cases} x, & \text{for } 0 \le x \le 1 \\ 2-x, & \text{for } 1 < x \le 2 \\ 0, & \text{otherwise} \end{cases}$$

(a) Obtain cumulative distribution function from $f(x)$

$$F(x) \begin{cases} 0, & (\infty, 0) \\ \frac{x^2}{2} & [0, 1] \rightarrow \int_0^x x \, dx \\ 2x - \frac{1}{2}x^2 & (1, 2] \rightarrow \int 2 - x \, dx \\ 1 & (2, \infty) \end{cases}$$

(b)

- $P(x < 0.2) = F(0.2) = \frac{0.2^2}{2} = \frac{1}{50}$
- $P(x \ge 1.5) = 1 - F(1.5) = 1 - F(1.5) + F(x > 2) = 0.125$
- $P(0.8 < x < 1.9) = F(1.9) - F(0.8) = 1 - 0.325 = 0.675$
- $E(X) = \int_0^1 x(x)\,dx + \int_1^2 x(2-x)\,dx = 1$