Worksheet 17

PMF, PDF, CDF

1. Find a value c such that the given function became PDF. If there's no such c, explain why. Also, find corresponding CDFs and compute $P(0 \le X \le 2)$.

   (a) $f(x) = \begin{cases} c & 0 \le x \le 25 \\ 0 & \text{otherwise} \end{cases}$

   (b) $f(x) = \begin{cases} cx(1-x) & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$

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

   (d) $f(x) = ce^{-|x|}$

2. Find CDF of a binomial distribution with $n = 4, p = 1/2$.

3. (*) Find CDF of a geometric distribution with $p = 1/3$.

4. (a) Suppose that the probability density function P that an atom emits a gamma wave with the PDF $f(t) = Cte^{-t^2}$ for $t \ge 0$ and $f(t) = 0$ for $t < 0$. Find $f(t)$ and calculate the CDF of $f(t)$.
   (b) For the above PDF, find the probability that a gamma wave is emitted from -2 seconds to 2 seconds.

5. For given CDF, compute the probability $P(-1 \le X \le 1)$ and find corresponding PDF (or PMF).

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

   (b) (*) $F(x) = A \arctan x + B$ (find A and B.)

   (c) (*)