AI1110: Probability and Random Variables

Assignment 9

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Outline

Question

Given that random variable x is of continuous type. we form the random variable $y = g(x)$.

1. Find $f_y(y)$ if $g(x) = 2F_x(x) + 4$.
2. Find $g(x)$ such that y is uniform in the interval $\{8, 10\}$.

Data given

Given,

$$y = 2F_x(x) + 4 \tag{1}$$
$$\implies 4 \leq y \leq 6 \tag{2}$$

Also,

$$g(x) = 2F_x(x) + 4 \tag{3}$$
$$g'(x) = 2f_x(x) \tag{4}$$

Solution

If $4 \leq y \leq 6$ and $y = 2F_x(x) + 4$ has a unique solution x_1 then,

$$f_y(y) = \frac{f_x(x_1)}{2f_x(x_1)} = \boxed{0.5} \tag{5}$$

If $8 < y < 10$, then $y = 2F_x(x) + 8$