Papoulis Question 5.14

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Outline

Question

Given that random variable x is of continuous type. we form the random variable $y = g(x)$. (a) Find $f_y(y)$ if $g(x) = 2F_x(x) + 4$. (b) Find $g(x)$ such that y is uniform in the interval (8, 10)

Solution

$$g(x) = 2F_x(x) + 4 \tag{1}$$
$$g'(x) = 2f(x) \tag{2}$$
$$\tag{3}$$

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

$$f_f(y) = \frac{f_x(x_1)}{2f_x(x_1)} = 0.5 \tag{4}$$

similarly $g(x) = 2F_x(x) + 4$