# Assignment 5

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# Outline

# Question

## Papoulis chap5 Ex 5.16

If $x$ represents a beta random variable with parameters $\alpha$ and $\beta$, show that $1 - x$ also represents a beta random variable with parameters $\beta$ and $\alpha$.

# Solution

Given $x$ is beta random variable,
$=> f_X(x) = \frac{1}{B(\alpha,\beta)} x^{\alpha-1}(1-x)^{\beta-1}, 0 < x < 1, \alpha > 0, \beta > 0$
Let $Y = 1 - X$ and $y = 1 - x$,
$=> f_Y(y) = \frac{1}{B(\alpha,\beta)} y^{\alpha-1}(1-y)^{\beta-1}$
$=> f_Y(y) = \frac{1}{B(\alpha,\beta)} (1-x)^{\alpha-1}x^{\beta-1}$
$=> f_Y(y) = \frac{1}{B(\alpha,\beta)} x^{\beta-1}(1-x)^{\alpha-1}$
Therefore, $1 - x$ is a beta random variable with parameters $\beta$ and $\alpha$.