

Continuous Random Variable Transformations

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

1. X is Uniform(0,17) and $Y=X^2$. Write the support and full piecewise CDF and PDF of Y.

Reference: On nonnegative support, x maps monotonically to x^2 and the inverse is $\sqrt{y}$.

2. X is Uniform(0,18) and $Y=3X+0$. Write the support and full piecewise CDF and PDF of Y.

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

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3. X is Uniform(0,2) and $Y=-4X+1$. Write the support and full piecewise CDF and PDF of Y.

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

4. X is Uniform(-3,3) and $Y=X^2$. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.

Reference: For $0<y<upper^2$, the event $X^2\leq y$ is $-\sqrt{y}\leq X\leq\sqrt{y}$; both inverse branches contribute to the density.

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5. X is Uniform(0,16) and $Y=\sqrt{x}$. Write the support and full piecewise CDF and PDF of Y.

Reference: The inverse is $x=y^2$. Differentiate $F_X(y^2)$ on the transformed support.

6. X is Uniform(0,25) and $Y=\sqrt{x}$. Write the support and full piecewise CDF and PDF of Y.

Reference: The inverse is $x=y^2$. Differentiate $F_X(y^2)$ on the transformed support.

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7. X is Uniform(-6,6) and $Y=X^2$. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.

Reference: For $0 < y < \text{upper}^2$, the event $X^2 \leq y$ is $-\sqrt{y} \leq X \leq \sqrt{y}$; both inverse branches contribute to the density.

8. X is Uniform(0,7) and $Y=-3X+1$. Write the support and full piecewise CDF and PDF of Y.

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.