

Exercises on exact transformations

The general formula has been shown for two **input** variables that go to two **output** variables. Obvious it is very general. In particular it holds for one variable to one variable, thus becoming

$$f(y) = \int \delta(y - Y(x)) f(x) dx .$$

Imagine X uniform in the range $[0, 1]$,

1. apply the formula for the following transformations

1.1 $Y = \sqrt{X}$;

1.2 $Y = X^2$,

getting thus $f(y)$ and also $F(y)$.

2. For the each tranformed distribution:

2.1 evaluate analitically **expected value** and **standard deviation**;

2.2 write the code to generate **random numbers**, using the method of the **inversion of the cumulative distribution**;

2.3 'check' the result by **Monte Carlo** extracting a sample of X and applying to it the above functions.

(This point is different from the the previous one, and it is the easiest to accomplish.)