Question:How to simplify y = Phi^(-1) (Phi(x)) into y=x?

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quantile simplification statistics + Manage Tags

19 hours ago

2

Let **Phi** the **CDF** of a **Normal(0, 1)** random variable and **F** the **CDF** of some random variable **X**.
Let $\mathbf{Phi}^{-1}$ the reciprocal function of **Phi**.

At some point of my code I get this expression $\mathbf{y := Phi^{-1}(F(x))}$.
Note that in the special case where **X** is **Normal(0, 1)** distributed, I simply have $\mathbf{y = Phi^{-1}(Phi(x)) = x}$.

I didn't wanted to give a specific treatment to this situation (***hoping that Maple would understand on its own that*** $\mathbf{(Phi^{-1} @ Phi)}$ ***was the identity function***) and so I got this representation of **y**.

```
y = RootOf(erf(_Z)-erf((1/2)*p*sqrt(2)))
```

This is of course correct but rather complex.

How can I simplify this expression to get **y = x**?

Here is an excerpt of my code

```
restart:
with(Statistics):
GRV := RandomVariable(Normal(0, 1)):
X   := RandomVariable(Normal(0, 1)):

Quantile(GRV, CDF(X, x));

                  /            /1    (1/2)\\  (1/2)
           RootOf|erf(_Z) - erf|- p 2     || 2
                 \            \2         //

y := Quantile(GRV, eval(CDF(X, x), x=0.975), numeric);

                  HFloat(0.9749999999206588)
```

TIA