Bonus Simulation
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The sequence $X_n$ is a random walk, i.e.

$$X_n = Z_1 + Z_2 + \cdots + Z_n$$

where $Z_n$ is iid.

Is the sequence $X_n$ stationary?

A. Yes
B. No
C. Yes if $Z_n$ has zero mean
D. Yes if $Z_n \sim N(0, \sigma^2)$
E. I don’t know
Is the simulator output \((X_1, X_2, \ldots)\) stationary?

A. Yes  
B. No  
C. It depends on \(\mu, \sigma\)  
D. I don’t know

\[ X_1 \sim N(\mu, \sigma^2) \]
for \(n = 2: n_{\text{max}}\)
\[ U \sim \text{Unif}(0,1) \]
if \(U < p\)
\[ X_n = X_{n-1} \]
else
\[ X_n \sim N(\mu, \sigma^2) \]
end
We simulate a random waypoint model with speed pdf $f_{V_0}$

Does this simulation have a stationary regime?

A. Yes
B. No
C. It depends on the parameters of $f_{V_0}$
D. I don’t know
myfun(\(a\))
\[= a \ \text{randexp( )} \]
where \text{randexp( )}
returns one sample of
the standard
exponential
distribution.

What does \text{myfun}(\(a\)) return?

A. A sample of an exponential
distribution with rate \(a\)
B. A sample of an exponential
distribution with rate \(1/a\)
C. None of the above
D. I don’t know
\( a > 0 \)

\[
\text{myfun}(a) = \\
\text{do} \\
\quad X = \text{randn}(1,1) \\
\text{until } X > a
\]

**What does myfun\((a)\) return?**

A. A sample of the standard normal distribution \(N(0,1)\)

B. A sample of a non standard normal distribution \(N(\mu, \sigma^2)\)

C. A sample of a non normal distribution

D. I don’t know
Independent outputs of a simulation are obtained by...

A. executing the runs on parallel threads using the same seed

B. executing the runs on parallel threads using truly random seeds

C. using the last RNG state of one run as seed to the next run

A. A
B. B
C. C
D. A and B
E. A and C
F. B and C
G. All
H. None
I. I don’t know
What does this program compute?

(A is a subset of \([0, 1]^n\))

A. A monte carlo estimate of \(\text{vol}(A)\)
B. A bootstrap estimate of the probability that a gaussian random vector is in \(A\)
C. None of the above
D. I don’t know

```
N=0
do r=1:R
    if (rand(n,1)∈ A) N = N + 1
end
return(N/R)
```
Which QQ-plot is for the exponential distribution?

A. None
B. A
C. B
D. C
E. A and B
F. A and C
G. B and C
H. All
I. I don’t know