

9.4 Random Numbers from Various Distributions

MATLAB Quick Review Questions

Introduction to Computational Science: Modeling and Simulation for the Sciences

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This file contains system-dependent text along with Quick Review Questions and answers in *MATLAB* for Module 9.4 on "Random Numbers from Various Distributions." Complete all code development in *MATLAB*.

Discrete Distributions

Quick Review Question 3 Give the command to generate an appropriate random number for Example 1 in the "Discrete Distributions" section of Module 9.3 on "Random Numbers from Various Distributions."

Quick Review Question 4 Give the statement for the pseudocode at the end of Example 2 in the "Discrete Distributions" section of Module 9.3 on "Random Numbers from Various Distributions." The *if* statement should return *POLLEN* or *EMPTY*, depending on the value of the random number.

Normal Distributions

randn returns a normally distributed random number with mean 0 and standard deviation 1. As with *rand*, *randn*(*n*) returns an *n*-by-*n* array of such numbers. For random numbers in a normal distribution with mean μ and standard deviation σ , we multiply *randn* by the standard deviation σ and add the mean μ , as in *randn* * σ + μ . The segment below assigns an array of 1000 normally distributed random numbers with mean 0 and standard deviation 1 to a variable *randNormal*. Figure 9.4.7 contains the display of a histogram of one such set of numbers.

```
tblNormal = randn(1, 1000);  
hist(tblNormal);
```

Quick Review Question 7 Write a *MATLAB* statement to assign to *n* a random number in a normal distribution with mean 70 and standard deviation 8.

Exponential Distributions

The *MATLAB* toolbox *Statistics* has its own version of this method. With argument *r*, *exprnd*(*r*) returns a random number in the distribution of the form re^{-rt} . For example, the

following command returns a random number from 0 to infinity in the probability distribution $2e^{-2t}$:

```
exprnd(2)
```

Quick Review Question 9 Consider the following command:

```
exprnd(5)
```

- a. Give the probability function.
- b. Indicate the interval to which the pseudorandom numbers belong.

A. between 0 and 5	B. between -5 and 0
C. greater than 0	D. less than 0
E. greater than 5	F. less than -5
- c. Indicate where such a random number is more likely to be.

A. close to 5	B. close to -5	C. close to 0
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Answers to Quick Review Questions

3. `randi(6)`

4. `if(rand < probbPollen) POLLEN, else EMPTY, end`

or

```
if(rand < probbPollen)
    POLLEN
else
    EMPTY
end
```

7. `n = 8 * randn + 70`

9. a. $5e^{-5t}$
- b. C. greater than 0
- c. C. close to 0