
exponential

syntax: `exponential(n, mean)`: generate n random values
`exponential(mean)`: create an URN for use by `SAMPLE`

purpose: Generate random numbers from an exponential distribution. This distribution models, for example, the lifetime of lightbulbs where there is a fixed probability of failure during any small time interval, and where the mean lifetime is given by the parameter `mean`.

examples:

```
>> x = exponential(1000, 5.2);
>> std(x)
ans:    5.6
```

The sample doesn't have exactly the specified mean; it's just a sample. The histogram shows the exponential shape:

```
>> histogram(x)
```

Suppose that a lightbulb factory produces bulbs with a mean lifetime that is 1250 hours, shorter than the 1500 hour lifetime specified by the contract with their main customer. To "fix" things, they buy some super-long life bulbs (lifetime of 50000 hours) from another manufacturer and randomly mix them into the shipment, putting in 1 long-life bulb into every box of 144 bulbs. What fraction of boxes will have a mean lifetime of less than the contractual 1500 hours?

```
badbulbs = exponential(1250);
superbulbs = exponential(50000);
z = starttally;
Ntrials = 1000;
for trials = 1:Ntrials
    onebox = concat( sample(143, badbulbs), sample(1,superbulb));
    a = mean(onebox);
    tally a z;
end
count(z<1500)/Ntrials
```

see also: `NORMAL`, `UNIFORM`, `URN`, `SAMPLE`

This document is an excerpt from

Resampling Stats in MATLAB

Daniel T. Kaplan

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703-522-2713

