demo_bino_nrom_rnd

October 18, 2023

[ ]:
```
graphics_toolkit('gnuplot');
```

[ ]:
```
pkg load statistics;
```

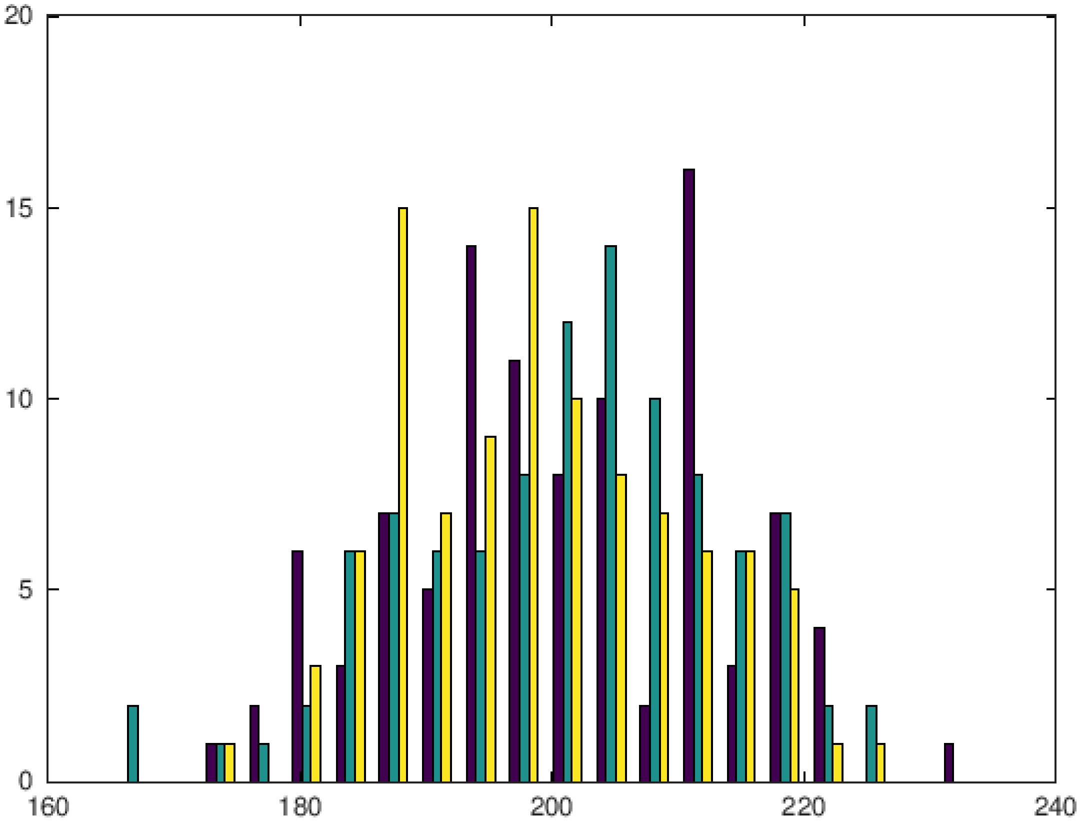
0.1

[3]:
```
p = binopdf(1,100,0.01)
```

```
p = 0.3697
```

[11]:
```
B = binornd(1000,  0.2, 100, 3);
```

[15]:
```
hist(B,20)
```



[8]:

```
size(B)
```

```
ans =

   100     3
```

[13]:

```
max(B)
```

```
ans =

   234   225   226
```

[10]:

```
max(B)
```

```
ans =

   33   30   36
```

0.2

[3]:

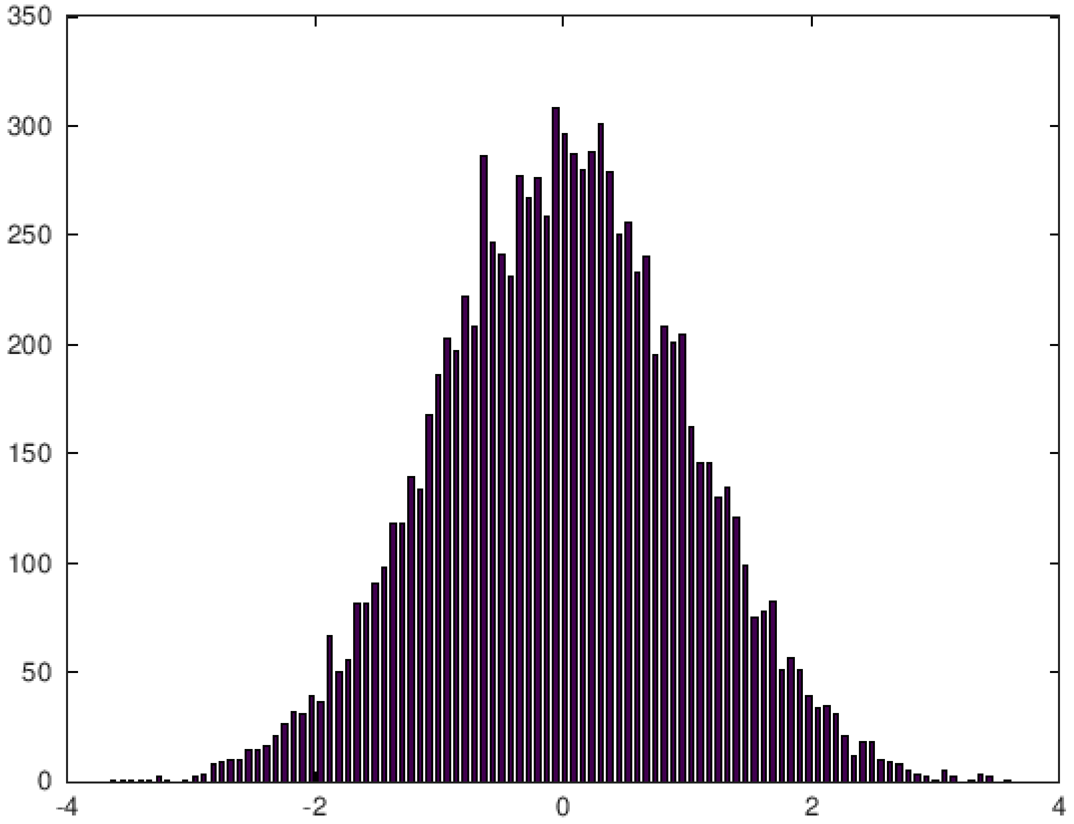
```
nbins = 100;
```

[4]:

```
m = 300; n = 10000;
R = unifrnd(-0.5, 0.5, m, n);
```

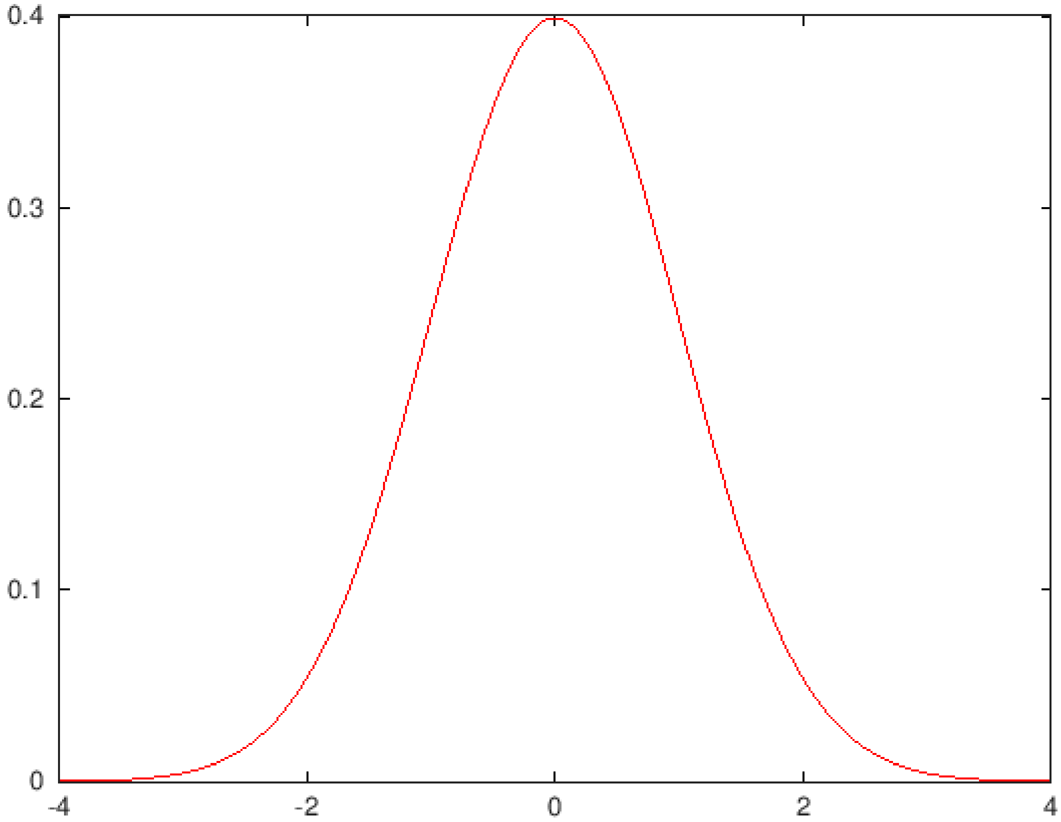
[5]:

```
Q = sum(R,1)/5;        % scaled by 5
[Y,X] = hist(Q, nbins);  % output value, do not plot
bar(X,Y, 0.5);
```



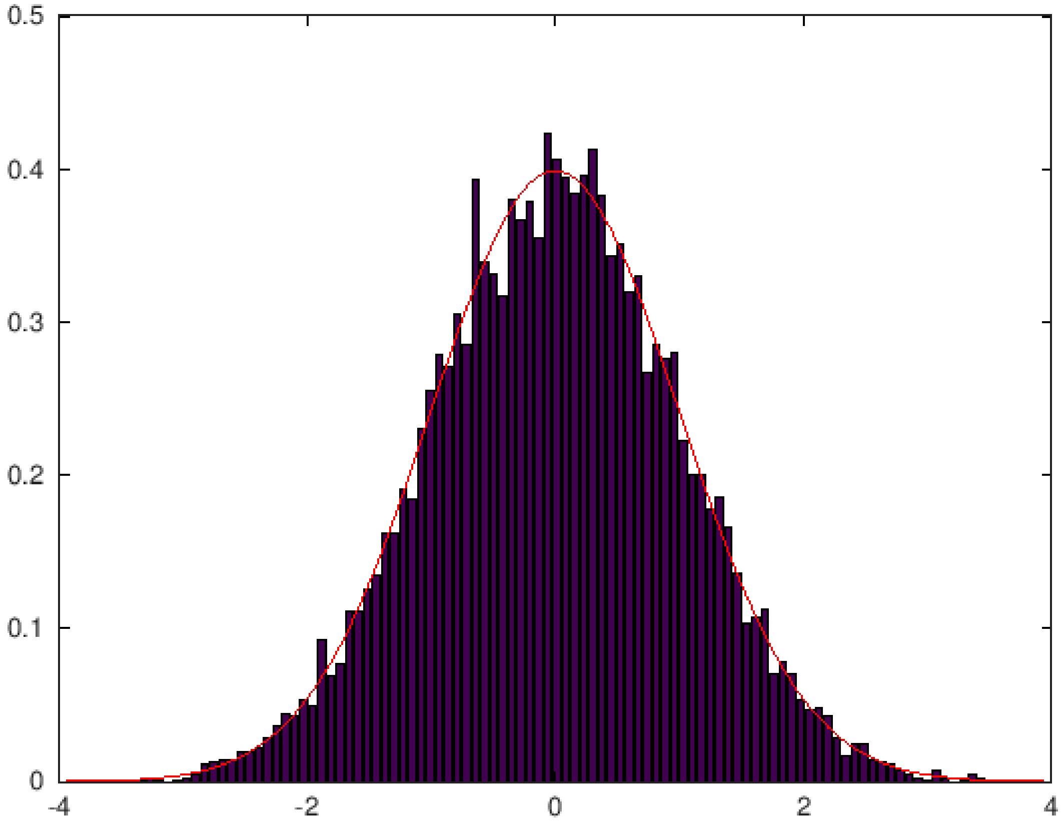
[6]:
```
t = -4.:0.05:4.;
Z = 1/sqrt(2*pi)*exp(-(t.*t)/2);
```

[7]:
```
plot(t,Z,'r');
```



[8]:
```
w = (max(Q) - min(Q))/nbins;
Y = Y/n/w;
```

[9]:
```
bar(X,Y); hold on;
plot(t,Z,'r'); hold off;
```



```
[9]: MSE = norm(Y - normpdf(X))/sqrt(nbins)
```

```
MSE = 145.73
```

0.2.1

```
[10]: t = 20; s0 = 100; r = 0.05/360; sigma = 0.03;
```

```
[18]: [mu, v] = lognstat(log(s0) + r*t, sigma*sqrt(t))
```

```
mu = 101.18
v = 185.96
```

```
[17]: pr = 1 - logncdf((1 + 0.15)*s0, log(s0) + r*t, sigma*sqrt(t))
```

```
pr = 0.1536
```

- now, begin the simulation, while the above is used to generate data

```
[13]: n = 500000;
      s = lognrnd(log(s0) + r*t, sigma*sqrt(t), 1, n);
```

[14]:

```
muhat = mean(s)
```

```
muhat = 101.16
```

[16]:

```
pshat = sum(s > (1 + 0.15)*s0)/n
```

```
pshat = 0.1533
```

0.2.2

[22]:

```
help unifrnd
```

```
'unifrnd' is a function from the file
/usr/share/octave/packages/statistics-1.4.3/distributions/unifrnd.m

 -- unifrnd (A, B)
 -- unifrnd (A, B, R)
 -- unifrnd (A, B, R, C, …)
 -- unifrnd (A, B, [SZ])
     Return a matrix of random samples from the uniform distribution on
     [A, B].

     When called with a single size argument, return a square matrix
     with the dimension specified.  When called with more than one
     scalar argument the first two arguments are taken as the number of
     rows and columns and any further arguments specify additional
     matrix dimensions.  The size may also be specified with a vector of
     dimensions SZ.

     If no size arguments are given then the result matrix is the common
     size of A and B.

Additional help for built-in functions and operators is
available in the online version of the manual.  Use the command
'doc <topic>' to search the manual index.

Help and information about Octave is also available on the WWW
at https://www.octave.org and via the help@octave.org
mailing list.
```

[25]:

```
unifrnd(-.5,.5,3,5)
```

```
ans =

   7.4828e-02  -1.9099e-01   3.4884e-03   2.0234e-01   4.9373e-02
   1.9413e-01   1.0324e-01  -2.7743e-01   2.8370e-01   3.1841e-02
  -2.0418e-01  -1.4925e-01   3.2601e-01  -3.7613e-01   3.0614e-01
```

[26]:

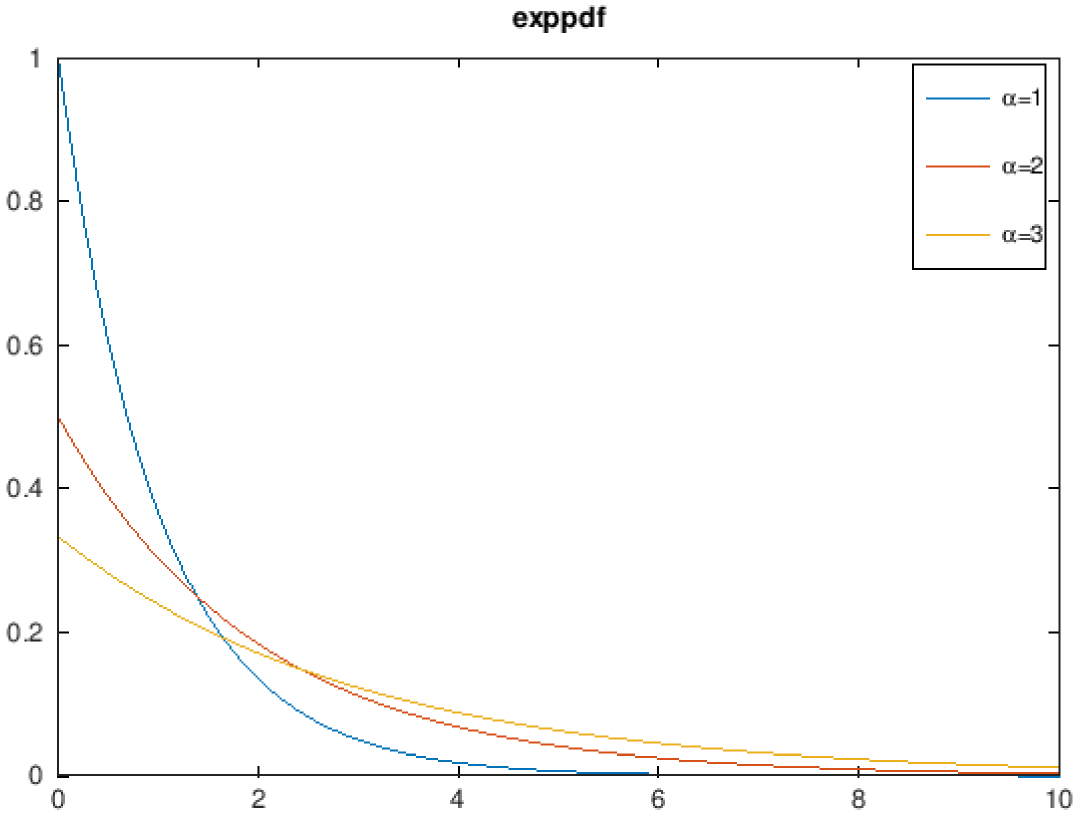
```
expf = @(x,alpha) exp(-x/alpha)/alpha;
```

[28]:

```
t = (0:0.05:10)';   u1 = expf(t, 1); u2 = expf(t, 2); u3 = expf(t, 3);
```

[29]:

```
plot(t, [u1, u2, u3], '-'); title('exppdf');  legend('\alpha=1', '\alpha=2',␣
  ↪'\alpha=3');
```



[ ]:

```
```