

EECS 461

Computer Project

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à **Load the statistics package `Master` which loads all statistics packages**

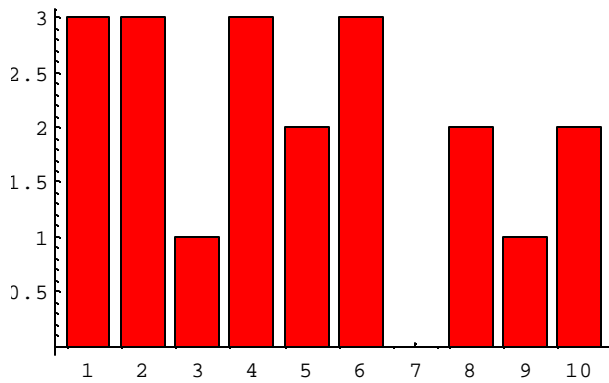
```
<< Statistics`Master`
```

Problem 1: A small Test Group

à **Begin the creation of the uniform random variable with 20 samples on range 0 to 1**

```
data = Table@Random@UniformDistribution@0, 1DD, 820<D  
  
80.970869, 0.885315, 0.30804, 0.267776, 0.184009, 0.0551318,  
0.972383, 0.0914195, 0.434718, 0.57955, 0.171803, 0.58146, 0.168551,  
0.787263, 0.476717, 0.0959566, 0.784764, 0.368413, 0.574913, 0.344383<  
  
<< Graphics`Graphics`  
  
freq = BinCounts@data, 80, 1, .1<D  
  
83, 3, 1, 3, 2, 3, 0, 2, 1, 2<  
  
values = 81, 2, 3, 4, 5, 6, 7, 8, 9, 10<  
  
81, 2, 3, 4, 5, 6, 7, 8, 9, 10<
```

BarChart@Transpose@8freq, values<DD



Above is a BarChart graphic of the uniform distribution created. Next we move on to create the exponential distribution from the above data.

...Graphics ...

à Begin creation of exponential distribution from the 20 uniform samples

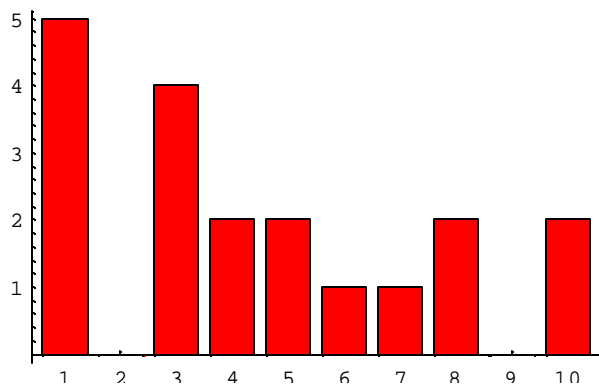
expdist = - Log@dataD

```
80.0295635, 0.121812, 1.17753, 1.3176, 1.69277, 2.89803,
0.028006, 2.3923, 0.833057, 0.545504, 1.76141, 0.542213, 1.78052,
0.239193, 0.740832, 2.34386, 0.242372, 0.99855, 0.553537, 1.066<
```

expfreq = BinCounts@expdist, 80, 2.5, .25<D

```
85, 0, 4, 2, 2, 1, 1, 2, 0, 2<
```

BarChart@Transpose@8expfreq, values<DD



Above is a BarChart of the exponential distribution created from 20 samples.

...Graphics ...

```
Mean@expdistD
```

```
1.06523
```

```
Variance@expdistD
```

```
0.715187
```

```
MeanCI@expdistD
```

```
80.669439, 1.46103<
```

```
VarianceCI@expdistD
```

```
80.413625, 1.52569<
```

Problem 2: A Larger Test Group

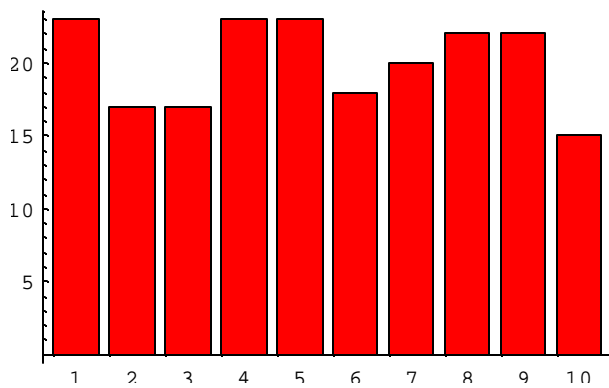
à **Begin the creation of 200 random uniform variables and the associated exponential distribution**

```
data2 = Table@Random@UniformDistribution@0, 1DD, 8200<D
```

```
freq2 = BinCounts@data2, 80, 1, .1<D
```

```
823, 17, 17, 23, 23, 18, 20, 22, 22, 15<
```

```
BarChart@Transpose@8freq2, values<DD
```



```
...Graphics ...
```

```
expdist2 = - Log@data2D
```

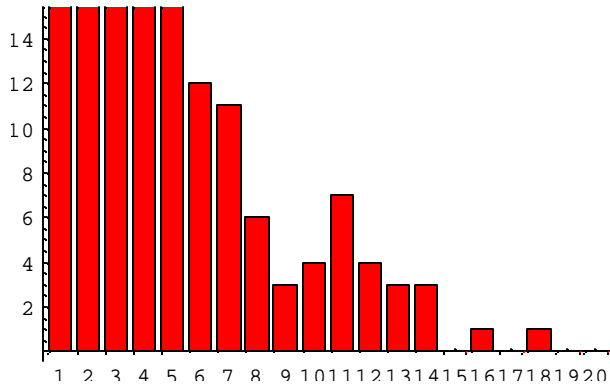
```
expfreq2 = BinCounts@expdist2, 80, 5.0, .25<D
```

```
841, 36, 27, 23, 17, 12, 11, 6, 3, 4, 7, 4, 3, 3, 0, 1, 0, 1, 0, 0<
```

```
values2 = 81, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20<
```

```
81, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20<
```

```
BarChart@Transpose@8expfreq2, values2<DD
```



```
...Graphics ...
```

```
Mean@expdist2D
```

```
0.993264
```

```
Variance@expdist2D
```

```
0.900947
```

```
MeanCI@expdist2D
```

```
80.860912, 1.12562<
```

```
VarianceCI@expdist2D
```

```
80.74716, 1.10791<
```

Problem 3: Hypothesis Testing for the Means

Ÿ For Problem 1:

```
MeanTest@expdist, 1, SignificanceLevel @ 0.05D
```

```
8OneSidedPValue @ 0.366957, Fail to reject null hypothesis at significance level @ 0.05<
```

Ÿ For Problem 2:

```
MeanTest@expdist2, 1, SignificanceLevel @ 0.05D
```

```
8OneSidedPValue @ 0.460081, Fail to reject null hypothesis at significance level @ 0.05<
```

Problem 4: Hypothesis Testing for the Variances

Ÿ For Problem 1:

```
VarianceTest@expdist, 1, SignificanceLevel @ 0.05D
```

```
8OneSidedPValue @ 0.192873, Fail to reject null hypothesis at significance level @ 0.05<
```

Ÿ For Problem 2:

```
VarianceTest@expdist2, 1, SignificanceLevel @ 0.05D
```

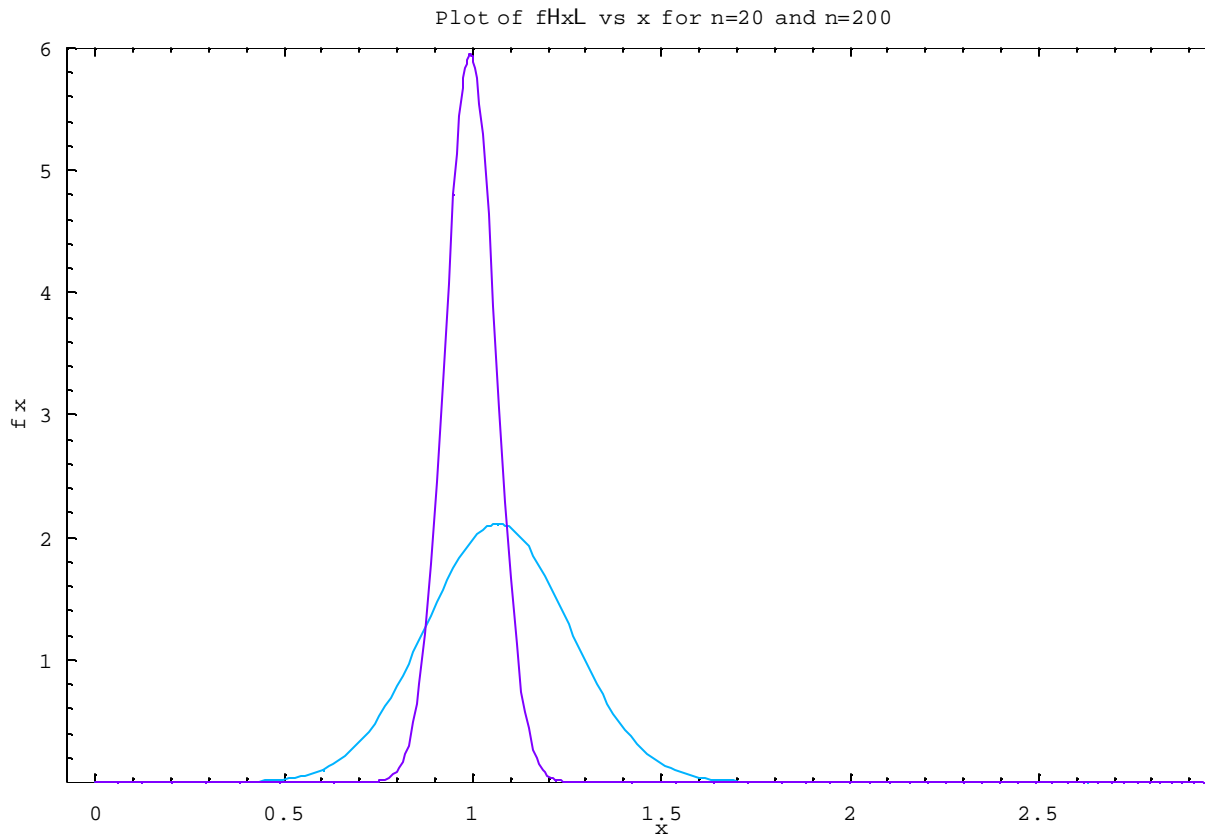
```
8OneSidedPValue @ 0.161333, Fail to reject null hypothesis at significance level @ 0.05<
```

Problem 5: Sampling Distributions

```

PlotA9 := Plot[ $\frac{1}{\sqrt{2\pi} \cdot H.715187 \cdot 200L}$  *  $e^{-\frac{H1.05593 - 1.2}{H2 \cdot 0.715187 \cdot 200L} x}$ ,  $\frac{1}{\sqrt{2\pi} \cdot H.900947 \cdot 200L}$  *  $e^{-\frac{H1.003264 - 1.2}{H2 \cdot 0.900947 \cdot 200L} x}$ ,
  {x, 0, 3}, PlotRange -> {80, 6}, FrameLabel -> {8x, fHxL}, Frame -> True,
  PlotLabel -> "Plot of fHxL vs x for n=20 and n=200",
  PlotPoints -> 200, PlotStyle -> {8Hue@0.55D, Hue@0.75D}<E

```



...Graphics ...