Solution

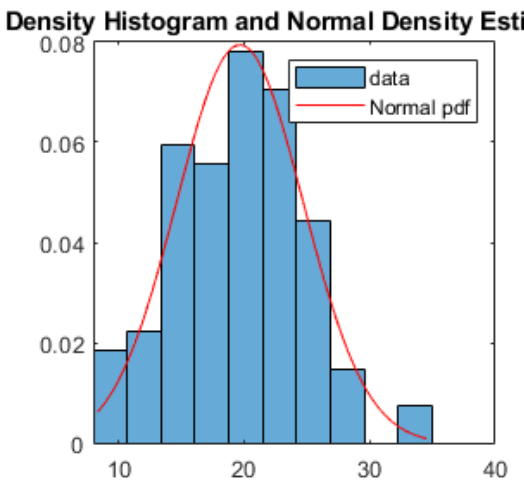
1. **Example:** Write a m-file/function (`graphs.m`), where the input parameter will be a vector of values X and the function will return graphs of exploratory data analysis (density histogram + theoretical probability density function $N(\overline{x}, s)$, boxplot and empirical distribution function + theoretical distribution function $N(\overline{x}, s)$), in one figure window. Generate $n = 100$ numbers and try created function.

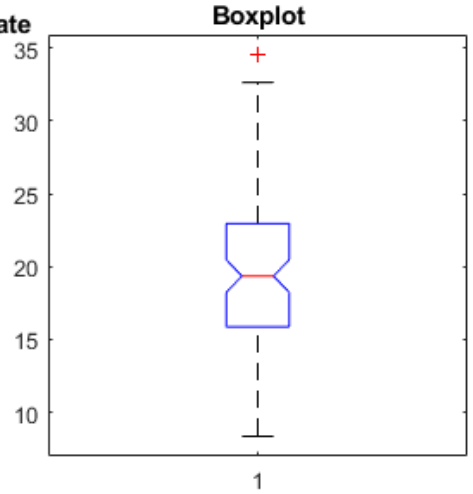
```
1   function graphs(X)
2   m=mean(X);
3   s=std(X);
4   x=min(X):0.01:max(X);
5   y=normpdf(x,m,s);
6   subplot(1,3,1),histogram(X,10,'normalization','pdf'),hold on,
7   plot(x,y,'r')
8   title('Density Histogram and Normal Density Estimate'),
9   axis square
10  legend('data','Normal pdf','Location','northeast')
11
12  subplot(1,3,2),boxplot(X,'notch','on'),title('Boxplot')
13  axis square
14
15  P = normcdf(x,m,s);
16  subplot(1,3,3),cdfplot(X),hold on,axis square
17
18  plot(x,P,'r'),
19  title('Cumulative Distribution Function');
20  legend('Empirical cdf','Normal cdf','Location','SouthEast')
```

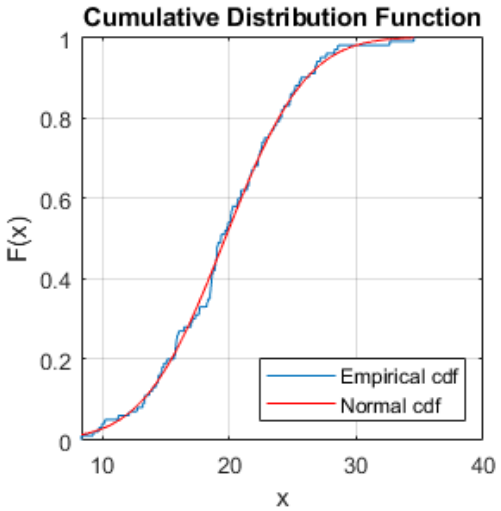
Solution

```
>> X=normrnd(20,5,1,100)
X =

  Columns 1 through 21

   16.9984   22.4498   23.6968   28.5594   19.0294    9.3082   ...
    15.8021   26.7730   14.6392   24.8048   20.6202   27.1835   ...
     10.1955   19.0115   13.9608   34.5400   24.1261   26.8949   ...
      14.7091   17.6569   18.6377

...

  Columns 85 through 100

   19.6607   19.0239   18.9120   18.4845   20.1152   20.2565   ...
    24.1303   27.6349   22.3346   18.9514   23.1260   20.9161   ...
     14.8512   24.7461   21.5353   20.6759

>> graphs(X)
```

Solution


Density Histogram and Normal Density Estimate
data
Normal pdf
0.08
0.06
0.04
0.02
0
10
20
30
40


Boxplot
35
30
25
20
15
10
1


Cumulative Distribution Function
F(x)
Empirical cdf
Normal cdf
1
0.8
0.6
0.4
0.2
0
10
20
30
40
x