Unit 5 - Week 3

Course outline

How does an NPTEL online course work?
Practice Assignment
Week 1
Week 2
Week 3
- Lecture 19: Descriptive statistics
- Lecture 20: Presenting experimental results: Data on conductivity of ETP copper
- Lecture 21: Property based reports, errors, significant digits
- Lecture 22: Dealing with distributions: Grain size data
- Lecture 23: Grain size data: Property and rank based reports
- Lecture 24: Case study: Grain size in a two phase steel
- Lecture 25: Grain size in a two phase steel: Descriptive statistics
- Lecture 26: Presenting experimental results: data with error bars
- Lecture 27: Errors and their propagation
- Lecture 28: Fitting experimental data to distributions
- Lecture 29: Combining uncertainties
- Lecture 30: Summary:Descriptive statistics
- Quiz : Assignment 3
- Download Videos
- Weekly Feedback
- Assignment 3 Solution

Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Text Transcripts

Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-19, 23:59 IST.

Assignment 3

1) The hardness (GPa) of the materials obtained by the nano-indentation by taking 29 indents on the specimen. The hardness data of each indents is as follows: ***1 point***

H(GPa)	H(GPa)	H(GPa)
0.398543	0.400716	0.399584
0.400178	0.396837	0.395825
0.397025	0.395391	0.372443
0.397712	0.388712	0.372771
0.328912	0.410321	0.39241
0.371864	0.391526	0.361294
0.381657	0.317901	0.394126
0.371634	0.341789	0.390178
0.369134	0.370913	0.386219
0.391824	0.356891	

Using R calculate the property based report of the data. Which of the following options corresponds to the report you have generated?

- mean : 0.380839
  median : 0.390178
  standard deviation : 0.02231319
  variance : 0.0004978786
- mean : 0.390178
  median : 0.380839
  standard deviation : 0.0004978786
  variance : 0.02231319
- mean : 0.280187
  median : 0.270893
  standard deviation : 0.0005797868
  variance : 0.03211315
- mean : 0.270893
  median : 0.280187
  standard deviation :0.03211315
  variance :0.0005797868

No, the answer is incorrect.
Score: 0
Accepted Answers:
mean : 0.380839
median : 0.390178
standard deviation : 0.02231319
variance : 0.0004978786

2) The stem and leaf plot of the hardness data set mentioned in question 1 is plotted with scale = 1 and width =30. Which of the following stem and leaf plot will be generated? ***1 point***

```
The decimal point is 2 digit(s) to the left of the |
31| 8
32| 9
33|
34|2
35|7
36|19
37|12223
38|269
39|02224567789
40|001
41|0
```

```
The decimal point is 2 digit(s) to the left of the |
31 | 8
32 |
32 | 9
33 |
33 |
34 | 2
34 |
35 |
35 | 7
36 | 1
36 | 9
37 | 12223
37 |
38 | 2
38 | 69
39 | 02224
39 | 567789
40 | 001
40 |
41 | 0
```

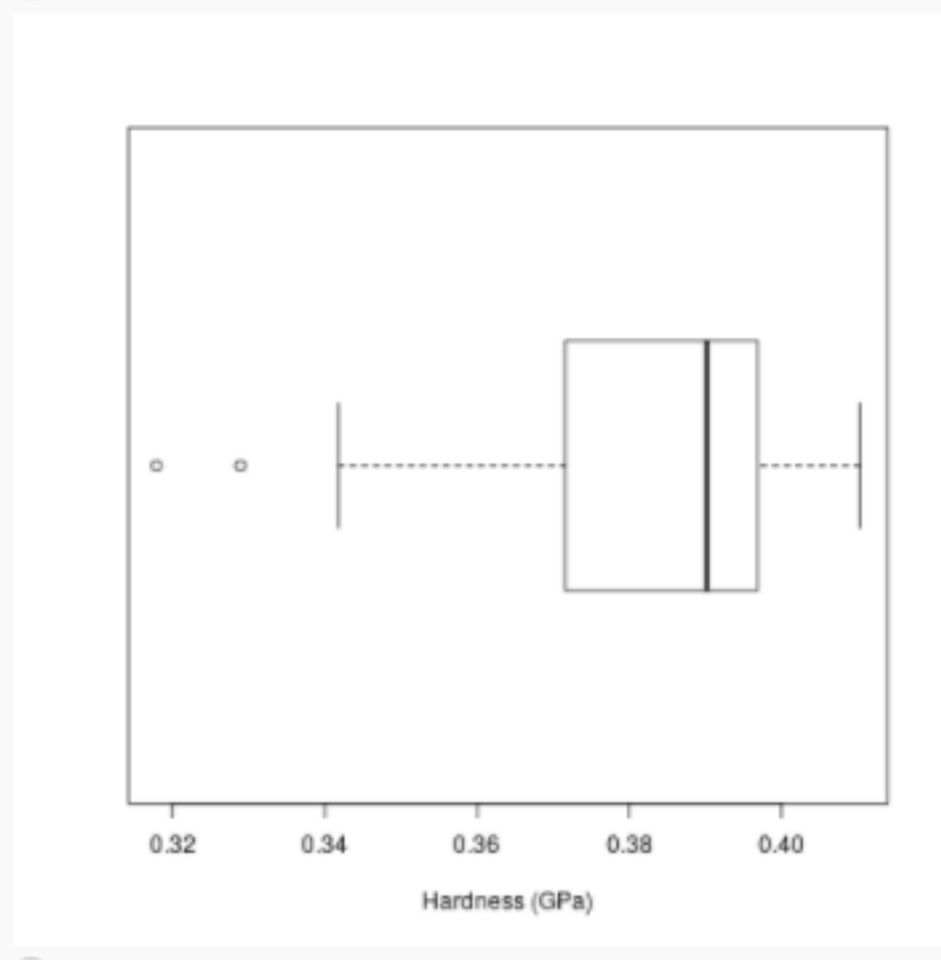
```
The decimal point is 2 digit(s) to the left of the |
21| 8
22| 9
23|
24|2
25|7
26|19
27|12223
28|269
29|02224567789
20|001
21|0
```

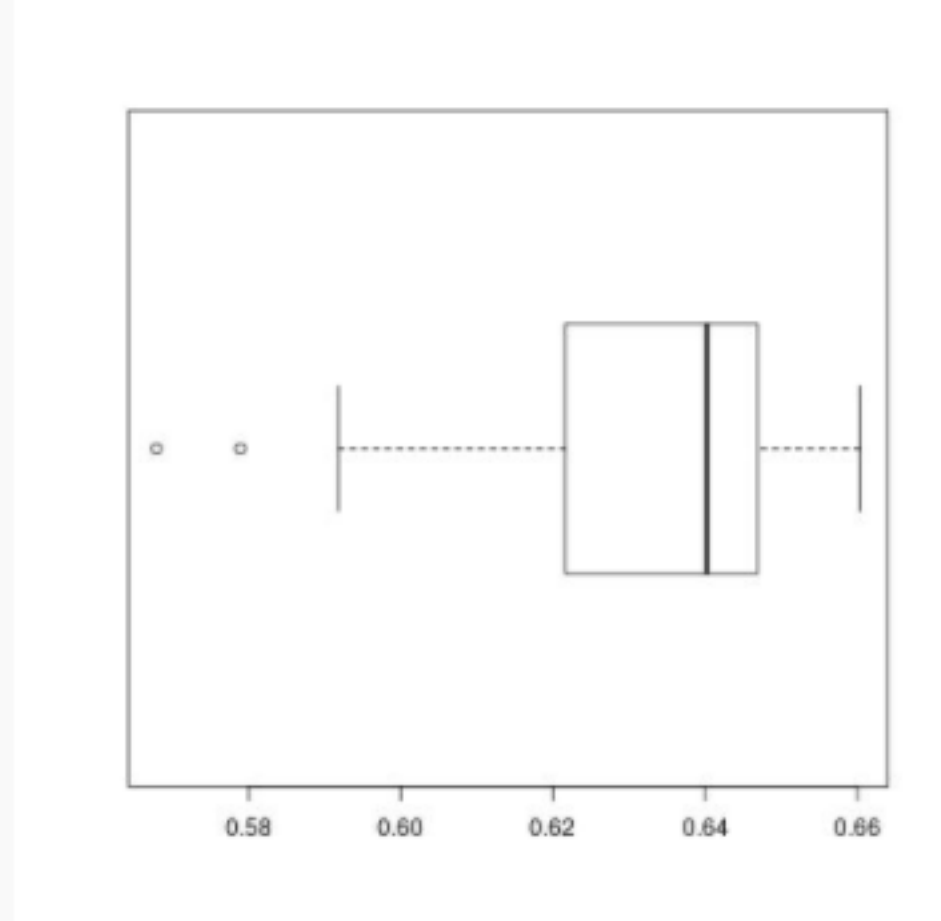
```
The decimal point is 2 digit(s) to the left of the
41 | 8
42 |
42 | 9
43 |
43 |
44 | 2
44 |
45 |
45 | 7
46 | 1
46 | 9
47 | 12223
47 |
48 | 2
48 | 69
49 | 02224
49 | 567789
50 | 001
50 |
51 | 0
```

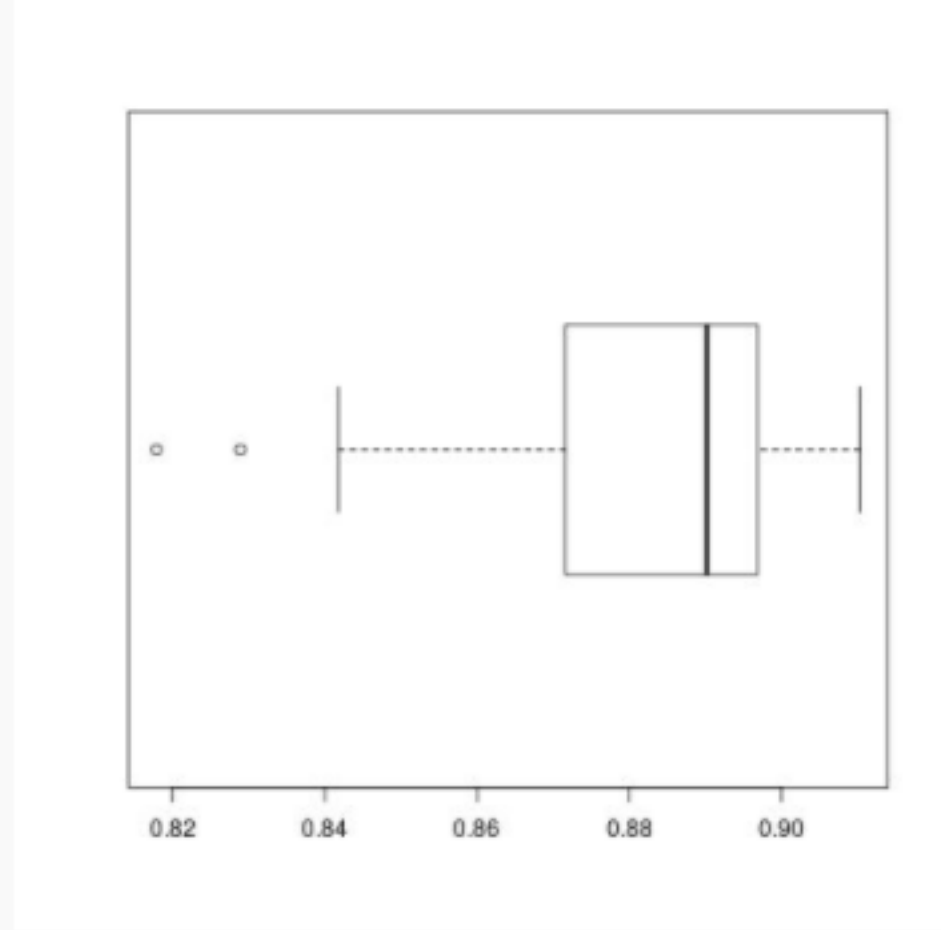
No, the answer is incorrect.
Score: 0
Accepted Answers:

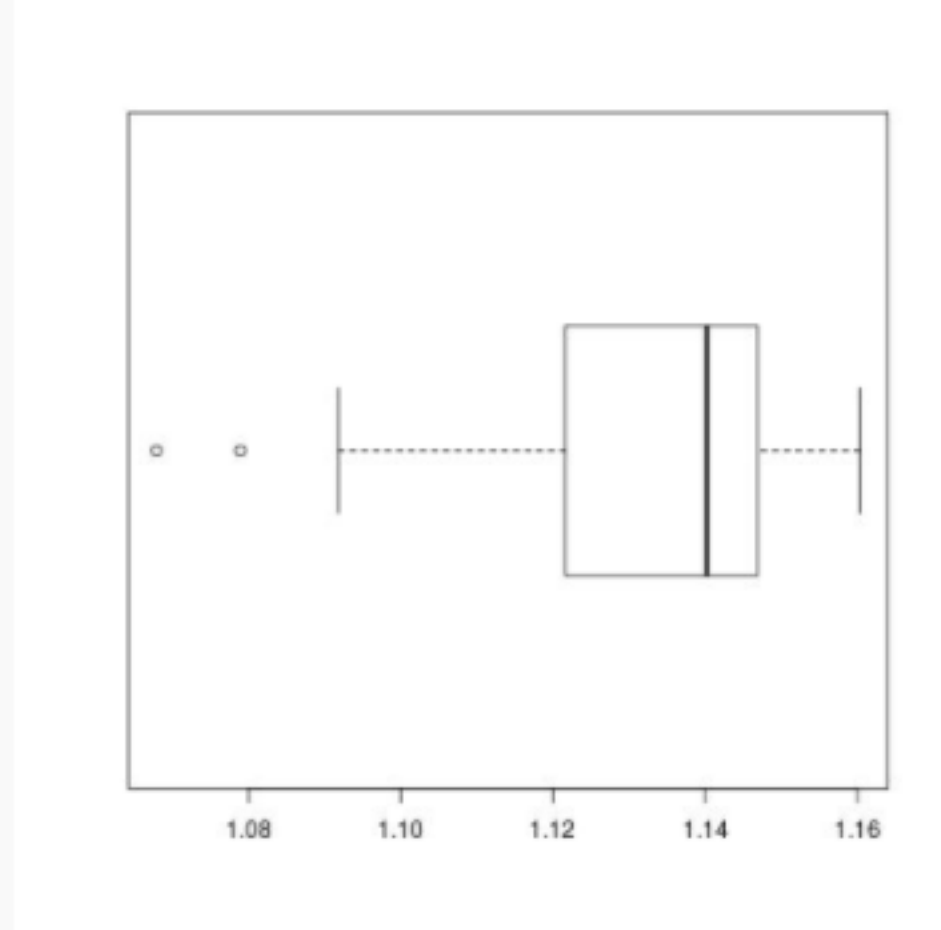
```
The decimal point is 2 digit(s) to the left of the |
31| 8
32| 9
33|
34|2
35|7
36|19
37|12223
38|269
39|02224567789
40|001
41|0
```

3) The box-plot of the hardness data set mentioned in question 1 is ***1 point***

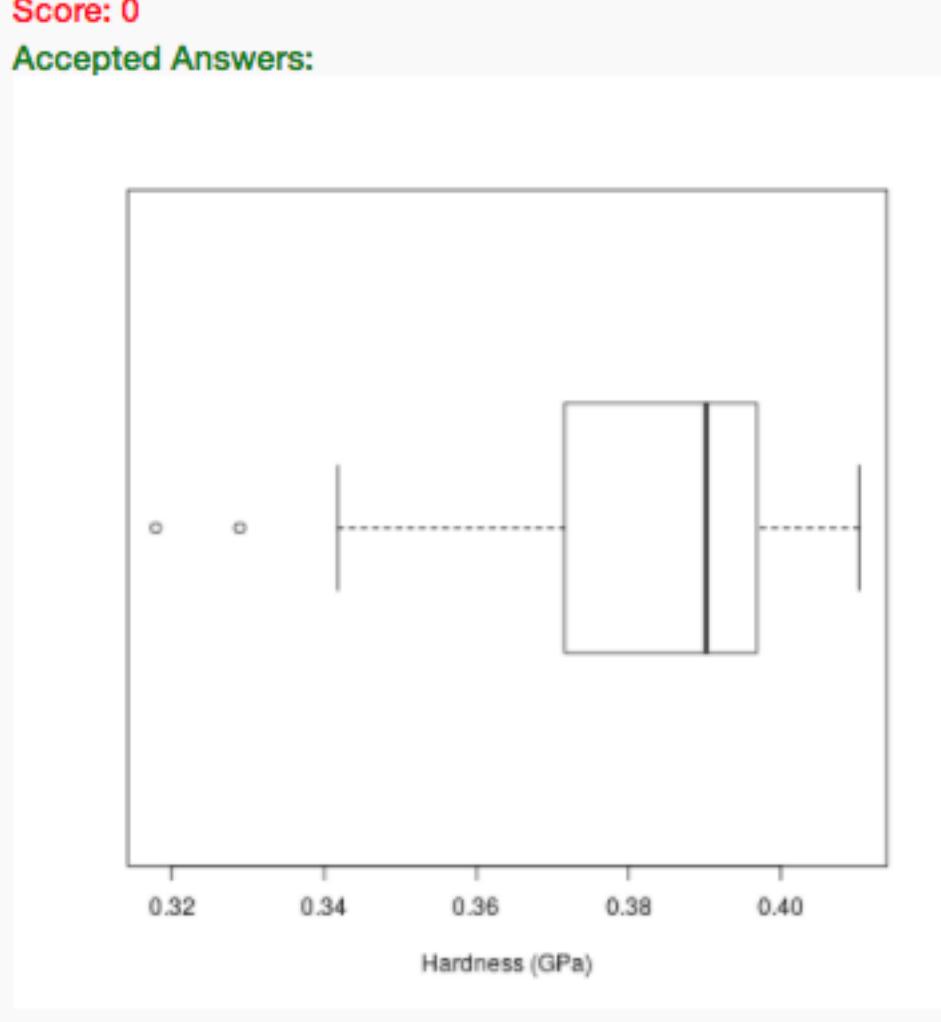








No, the answer is incorrect.
Score: 0
Accepted Answers:



4) The second quantile of the hardness data set mentioned in question 1 is ***1 point***

- 0.390178
- 0.17
- 0.45
- 0.209718

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.390178

5) The second quantile of the hardness data set mentioned in question 1 is ***1 point***

- left skewed
- right skewed
- symmetrically distributed
- cannot comment

No, the answer is incorrect.
Score: 0
Accepted Answers:
left skewed

6) The estimated skewness and kurtosis value of the hardness data set in mentioned in question 1 is ***1 point***

- -1.3637 and 4.557354
- 4.557354 and -1.3637
- -3.5627 and -9.677534
- 3.5627 and 9.677534

No, the answer is incorrect.
Score: 0
Accepted Answers:
-1.3637 and 4.557354

7) The probability distribution function of random variable X which represents defects in steel plate production is as follows: ***1 point***
For calculating the expectation and variance of the random variable X, which of the following code snippets is correct?

X	0	1	2	3	4	5	6
f(X)	0.32	0.26	0.15	0.13	0.08	0.05	0.01

```
x <- (define random variable)
fx <- (define probability distribution function)
expectation <- sum(x*fx)
variance <- sum(x^2*fx) - (sum(x*fx))^2
```

```
x <- (define random variable)
fx <- (define probability distribution function)
expectation <- sum(x^2*fx)
variance <- sum(x^2*fx) - (sum(x*fx))^3
```

```
x <- (define random variable)
fx <- (define probability distribution function)
expectation <- (sum(x*fx))^2
variance <- (sum(x^2*fx))^2 - (sum(x*fx))^2
```

```
x <- (define random variable)
fx <- (define probability distribution function)
expectation <- sum(x^3*fx)
variance <- sum(x^3*fx) - (sum(x*fx))^3
```

No, the answer is incorrect.
Score: 0
Accepted Answers:

```
x <- (define random variable)
fx <- (define probability distribution function)
expectation <- sum(x*fx)
variance <- sum(x^2*fx) - (sum(x*fx))^2
```

8) Consider the hardness data set mentioned in question 1, the mean is mean : 0.380839 and the standard deviation is 0.022313. The correct representation of hardness (with absolute error) is ***1 point***

- 0.380839 ± 0.02231319
- 0.380839 ± 0.022313
- 0.380839 ± 0.0223131
- All the above options are correct

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.380839 ± 0.022313

9) Consider the hardness data set mentioned in question 1. The correct representation of hardness (with relative error) is ***1 point***

- 0.380839 ± 2.23%
- 0.380839 ± 5.85%
- 0.380839 ± 0.49787%
- 0.380839 ± 0.58589%

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.380839 ± 5.85%

10) Consider the following data on density versus electrical conductivity of water and brine solutions as reported by Gechter et al, Water Resources Research, Vol 44, W11409, 2008: ***1 point***

Density (gcc)	σ (mS/cm)	Density (gcc)	σ (mS/cm)
1.193	244	0.9962	0.402
1.194	245	0.9972	0.407
1.200	242	0.9973	0.398
1.200	245	0.9975	0.413
1.200	245	0.9969	0.408
1.199	244	0.9979	0.403
1.197	244	0.9980	0.406
1.199	243	0.9982	0.400

Suppose we want to plot the density on the x-axis and the condutivity on the y-axis.Suppose we want to give a gap in the y-axis since the values change by three orders of magnitude. Which of the following code snippets achieves this?

```
x <- (define dataset)
gap.plot(x[,1],x[,2],gap = c(1,240),gap.axis="y")
```

```
library("plotrix")
x <- (define dataset)
gap.plot(x[,1],x[,2],gap = c(1,240),gap.axis="y")
```

```
library("plotrix")
x <- (define dataset)
plot(x[,1],x[,2],gap = c(1,240),gap.axis="y")
```

```
library("plotrix")
x <- (define dataset)
gap.plot(x[,1],x[,2],gap = c(1,240),gap.axis="x")
```

No, the answer is incorrect.
Score: 0
Accepted Answers:

```
library("plotrix")
x <- (define dataset)
gap.plot(x[,1],x[,2],gap = c(1,240),gap.axis="y")
```

11) Consider the data set on density and conductivity shown above. Suppose we want togenerate two plots: the first two columns form one plot and the next two columns form the second plot. We want to plot both these plots in the same figure, one below the other. ***1 point***
The correct command for achieving this is

- par(mfrow = c(1,2))
- par(2,1)
- par(mfcol = c(2,1))
- plot(c(2,2))

No, the answer is incorrect.
Score: 0
Accepted Answers:
par(mfcol = c(2,1))

12) Which of the following are valid abline commands? ***1 point***

- abline(3,2)
- abline(h=5)
- abline(v=7)
- abline(regfit)

No, the answer is incorrect.
Score: 0
Accepted Answers:
abline(3,2)
abline(h=5)
abline(v=7)

13) What are the x- and y-axes of the Cullen and Frey graph? ***1 point***

- CDF, data
- empirical quantiles, theoretical quantiles
- empirical probabilities vs theoretical probabilities
- square of skewness, kurtosis

No, the answer is incorrect.
Score: 0
Accepted Answers:
square of skewness, kurtosis