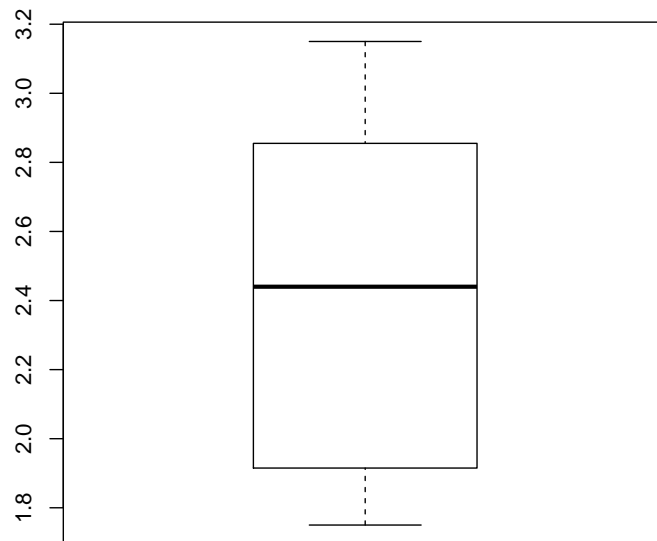


2028: Basic Statistical Methods
Solutions - Homework 1

1 NEED SOLUTIONS: b c d a

2 NEED DETAILS

- (a) sample mean = $\frac{1.75+1.92+2.62+2.35+3.09+3.15+2.53+1.91}{8} = 2.415$
sample variance = $[(1.75-2.415)^2 + (1.92-2.415)^2 + (2.62-2.415)^2 + (2.35-2.415)^2 + (3.09-2.415)^2 + (3.15-2.415)^2 + (2.53-2.415)^2 + (1.91-2.415)^2]/(8-1) = 0.285$
sample standard deviation = $\sqrt{0.285} = 0.534$
- (b) boxplot:



3 NEED MORE DETAILS

- (a) sample mean = 952.44
sample variance = 9.53
sample standard deviation = 3.09
- (b) range = $957 - 948 = 9$
median = 953
Any increase in the largest temperature measurement will not affect the median.

(c) $Q1 = \frac{949+950}{2} = 949.5$

$$Q3 = \frac{955+955}{2} = 955$$

$$IQR = Q3 - Q1 = 5.5$$

(d) sample mean = 1007.2

sample variance = 29990.18

sample standard deviation = 173.177

$$\text{median} = \frac{953+954}{2} = 953.5$$

$$\text{range} = 1500 - 948 = 552$$

$$Q1 = 950$$

$$Q3 = 955$$

$$IQR = 955 - 950 = 5$$

Median, Q1, Q3, IQR are robust to the outlier.

4 NEED MORE DETAILS

(a) The decimal point is at the |

61 | 0

62 | 00

63 | 00

64 | 0000

65 | 00000000

66 | 0000

67 | 00000000

68 | 00000

69 | 00

70 | 0

mean= 65.81

standard deviation= 2.11

median= 66

(b) The decimal point is at the |

0 | 61 |

00 | 62 |

00 | 63 |

0000 | 64 | 00

```
00000000 | 65 |
```

0000 | 66 | 00000

```
00000000 | 67 |
```

```
00000 | 68 | 00000000000000000000000000000000
```

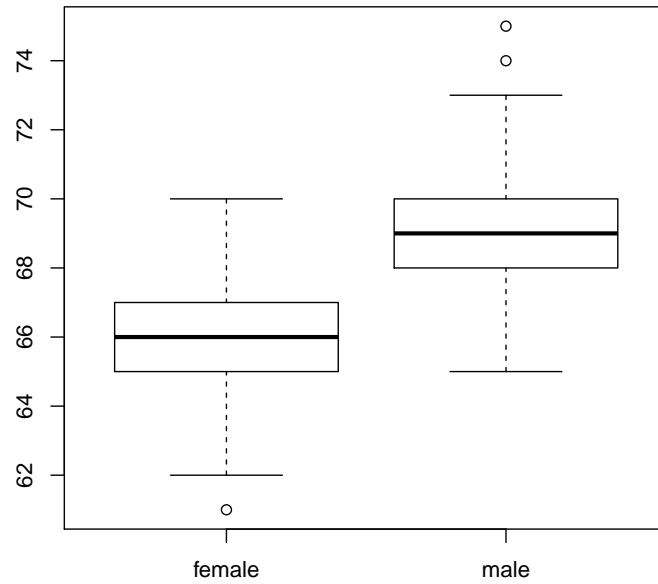
00 | 69 |

```
0 | 70 | 00000000000000
```

| 72 | 0000

| 74 | 00

(c) boxplot:



5 NEED MORE DETAILS

(a) False:

The decimal point is at the |

2		55
3		0000555
4		0055
5		00555
6		000005555
7		05
8		0000
9		0

Felt:

The decimal point is at the |

2		55
3		000555555
4		005555
5		00000055
6		055

7 | 0005
8 | 5
9 | 0

Miserable:

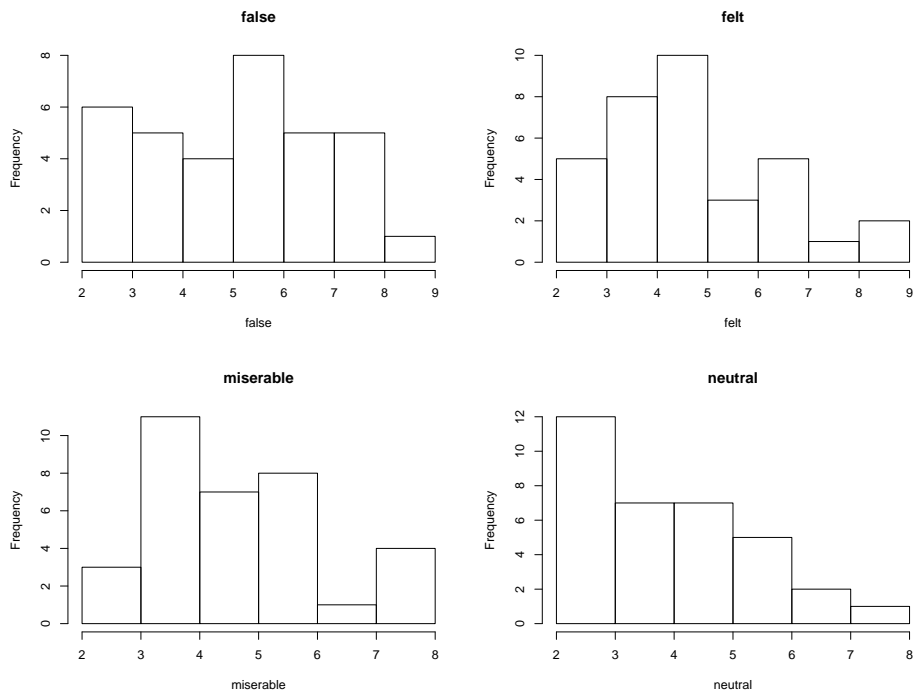
The decimal point is at the |

2 | 5
3 | 005555
4 | 0000000555
5 | 0000555555
6 | 005
7 | 5
8 | 000

Neutral:

The decimal point is at the |

2 | 00055555
3 | 000055
4 | 00000555555
5 | 05
6 | 000055
7 |
8 | 0



Comment on the distribution of observations:

The data are not very symmetric for four categories, especially for “felt” and “neutral”. They are skew to the right. The distributions of “felt”, “miserable” and “neutral” are unimodal, and distribution of “false” is bimodal.

Interpret and Compare:

From their different distributions, we could see “false” > “felt” ≥ “miserable” > “neutral” in mean and median. Therefore, we conclude that different types of smiles are differently effective, and smiling increases leniency.

(b) \$false

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.500	3.625	5.500	5.368	6.500	9.000

\$felt

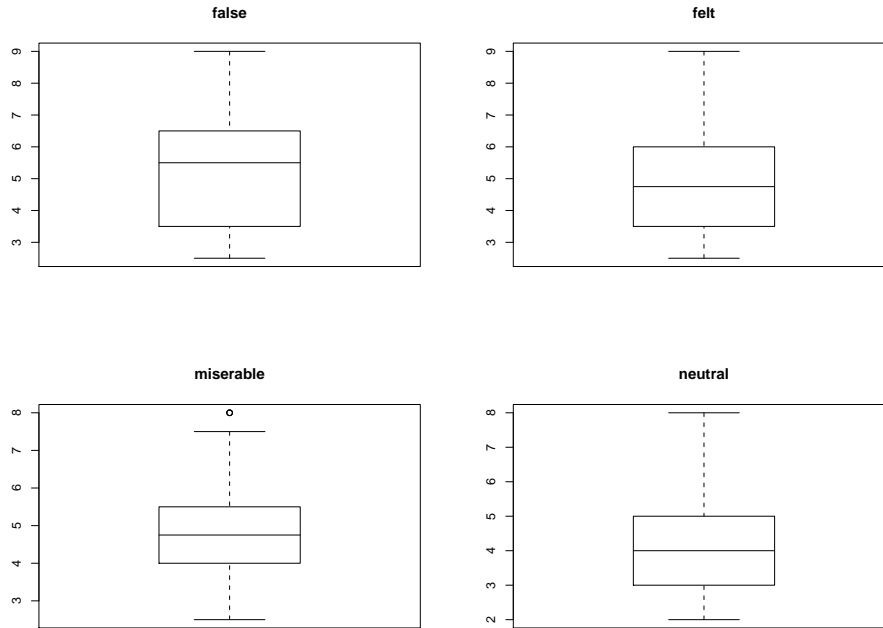
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.500	3.500	4.750	4.912	5.875	9.000

\$miserable

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.500	4.000	4.750	4.912	5.500	8.000

\$neutral

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.000	3.000	4.000	4.118	4.875	8.000



Interpret and Compare:

From their different mean and median, “false” > “felt” ≥ “miserable” > “neutral”, we conclude that different types of smiles are differently effective, and smiling increases leniency.

(c) ADD DISCUSSION