

The concentration of calcium (nM) in blood samples from 38 healthy people is listed below.

95	110	135	120	88	125	112	100	130	107
86	130	122	122	127	107	107	107	88	126
125	112	78	115	78	102	103	93	88	110
104	122	112	80	121	126	90	96		

(a) Display the data in a stem-and-leaf diagram.

Solution: If you do the simplest thing and use the ones digit as the leaf, you get this.

```
R> stem(calcium)
```

```
The decimal point is 1 digit(s) to the right of the |
```

```

7 | 88
8 | 06888
9 | 0356
10 | 02347777
11 | 002225
12 | 0122255667
13 | 005

```

You could also get a reasonable stem-and-leaf diagram by splitting stems.

```
R> stem(calcium, scale = 2)
```

```
The decimal point is 1 digit(s) to the right of the |
```

```

7 | 88
8 | 0
8 | 6888
9 | 03
9 | 56
10 | 0234
10 | 7777
11 | 00222
11 | 5
12 | 01222
12 | 55667
13 | 00
13 | 5

```

(b) Characterize the data as one of the following:

1. strongly skewed to the left
2. slightly skewed to the left
3. approximately symmetric
4. slightly skewed to the right
5. strongly skewed to the right

Solution: The data has a very slight skew to the left.

(c) Find the first quartile, median, and third quartile. Indicate the method you use to find the quartiles, as different methods (which can give different solutions) are valid.

Solution:

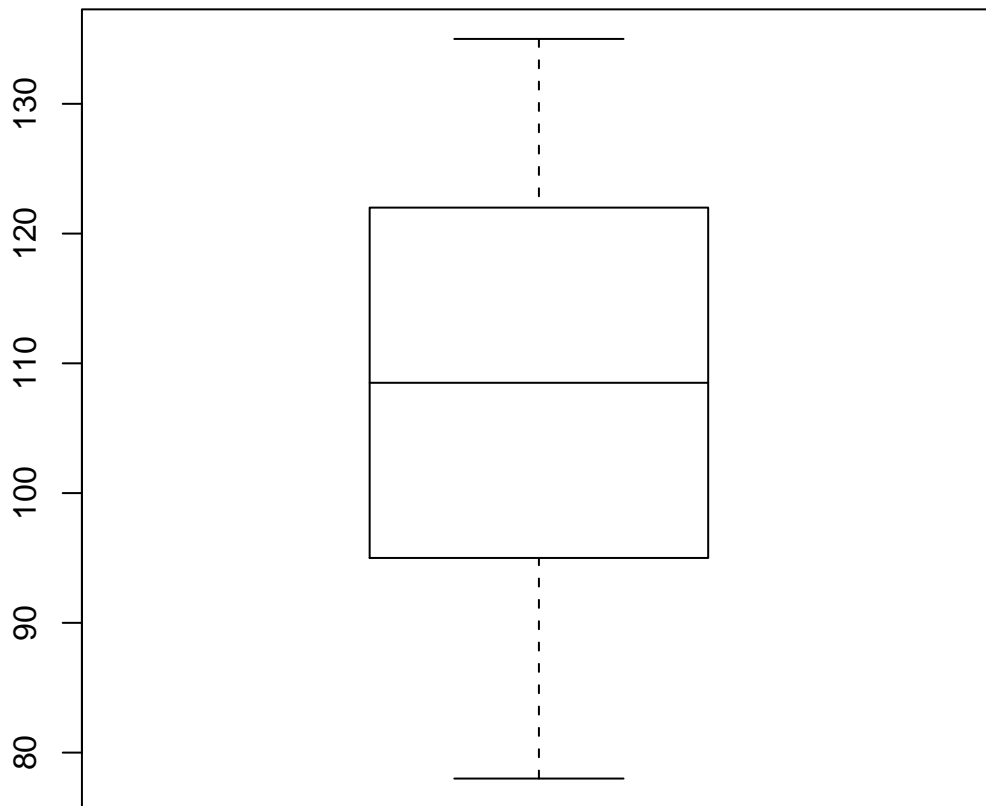
```
R> fivenum(calcium)
```

```
[1] 78.0 95.0 108.5 122.0 135.0
```

- (d) Display the data with a modified boxplot. Find the lower and upper fence using the 1.5 IQR rule. Identify any outliers (if any) outside these fences.

Solution: The fences are 54.5 and 162.5 which extend beyond all data points, so there are no outliers by this rule.

```
R> boxplot(calcium)
```



- (e) Without calculation, explain how the shape of the distribution (as evident in the stem-and-leaf diagram or the boxplot) provides information about the value of the mean relative to the value of the median you calculated in part (c).

Solution: There is a very slight skewness to the left, so we expect the mean will be slightly smaller than the median.