Verzani Problem Set
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Problem 2.1
Suppose you keep track of your mileage each time you fill up. At your last 6 fill-ups the mileage was

65311	65624	65908	66219	66499	66821	67145	67447

Enter these numbers into R. Use the function diff on the data. What does it give?

```
> miles = c(65311, 65624, 65908, 66219, 66499, 66821, 67145, 67447)
> x = diff(miles)
```

The last function shows you the number of miles between fill-ups.
Find the minimum, maximum and average number of miles between fill-ups.

```
> min(miles)
[1] 65311
> max(miles)
[1] 67447
> mean(miles)
[1] 66371.75
```

Problem 2.2
Suppose you track your commute times for two weeks (10 days) and you find the following times in minutes

17	16	20	24	22	15	21	15	17	22

Enter this into R.

```
> commutes = c(17, 16, 20, 24, 22, 15, 21, 15, 17, 22)
```

Find your shortest, longest and average commute times.

```
> min(commutes)
[1] 15
> max(commutes)
[1] 24
> mean(commutes)
[1] 18.9
```

Oops, the 24 was a mistake. It should have been 18. How can you fix this?

```
> mistaken = which(commutes == 24)
> commutes[mistaken] = 18
```

Find the new average.

```
> mean(commutes)
```

[1] 18.3

How many times was your commute 20 minutes or more?

```
> sum(commutes >= 20)
[1] 4
```

What percent of your commutes take less than 17 minutes?

```
> sum(commutes < 17) / length(commutes) * 100
[1] 30
```

Problem 2.3
Your cell phone bill varies from month to month. Suppose your year has the following monthly amounts

46   33   39   37   46   30   48   32   49   35   30   48

Enter this data into a variable called bill.

```
> bill = c(46, 33, 39, 37, 46, 30, 48, 32, 49, 35, 30, 48)
```

Find how much you spent on cell phone this year.

```
> sum(bill)
[1] 473
```

What is the smallest amount you spent in a month?

```
> min(bill)
[1] 30
```

What is the largest?

```
> max(bill)
[1] 49
```

How many months was the amount greater than $40?

```
> sum(bill > 40)
[1] 5
```

What percentage of the months was this?

```
> sum(bill > 40) / length(bill) * 100
[1] 41.66667
```

Problem 2.4
You want to buy a used car and find that over 3 months of watching the classifieds you see the following prices (suppose the cars are all similar)

9000	9500	9400	9400	10000	9500	10300	10200

```
> price = c(9000, 9500, 9400, 9400, 10000, 9500, 10300, 10200)
```

Use R to find the average value and compare it to Edmund's (http://www.edmunds.com) estimate of $9500.

```
> mean(price)
[1] 9662.5
> mean(price) > 9500
[1] TRUE
```

Use R to find the minimum value and the maximum value.

```
> min(price)
[1] 9000
> max(price)
[1] 10300
```

Problem 2.5
Try to guess the results of these R commands. We assume:

```
> x = c(1,3,5,7,9)
> y = c(2,3,5,7,11,13)
> x + 1
[1]  2  4  6  8 10

> y * 2
[1]  4  6 10 14 22 26

> length(x)
[1] 5

> length(y)
[1] 6

> x + y
[1]  3  6 10 14 20 14
```

Warning in x + y: longer object length is not a multiple of shorter object length

```
> sum(x > 5)
[1] 2

> sum(x[x > 5])
[1] 16

> sum(x > 5 | x < 3)
[1] 3

> y[3]
```

```
[1] 5

> y[-3]
[1]  2  3  7 11 13

> y[x]
[1]  2  5 11 NA NA

> y[y >= 7]
[1]  7 11 13
```