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
```