

Data vectors

math612.0 A1: From numbers through algebra to calculus and linear algebra

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The plane

Pairs of numbers can be depicted as points on a plane.
The plane is normally denoted by \mathbb{R}^2 .

Simple plots in R

Graphing functions in R

- `plot` - plots a scatter plot (as a line plot)
- `points` - adds points to a plot
- `text` - adds text to a plot
- `lines` - adds lines to a plot

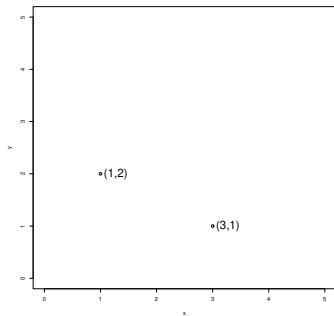


Figure: Points on a plane, drawn with R.

The following R commands can be used to generate a plot with two points:

```
> plot(1,2,xlim=c(0,5),ylim=c(0,5),xlab="x",ylab="y")
> points(3,1)
> text(1,2,"(1,2)",pos=4, cex=2)
> text(3,1,"(3,1)",pos=4, cex=2)
```

Data

Data are usually a sequence of numbers, typically called a vector.

Indices for a data vector

If data are in a vector x , then we use indices to refer to individual elements. If i is an integer then x_i denotes the i 'th element of x . Note that we do not distinguish (much) between rows and columns.

Summation

We use the symbol Σ to denote sums.

In R, the sum function adds numbers.

If $x = (4, 5, 3, 7)$ then

$$\sum_{i=2}^4 x_i = x_2 + x_3 + x_4 = 5 + 3 + 7 = 15.$$

Within R:

```
> x<-c(4,5,3,7)
> x
[1] 4 5 3 7
> sum(x)
[1] 19
>
```

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