

Lab 4 (by Svenja Lowitzsch)

Chapter 8

Sequences and Series

```
> a:=n->1/n^2;
```

$$a := n \rightarrow \frac{1}{n^2}$$

```
> seq(a(n),n=5..9);
```

$$\frac{1}{25} \frac{1}{36} \frac{1}{49} \frac{1}{64} \frac{1}{81}$$

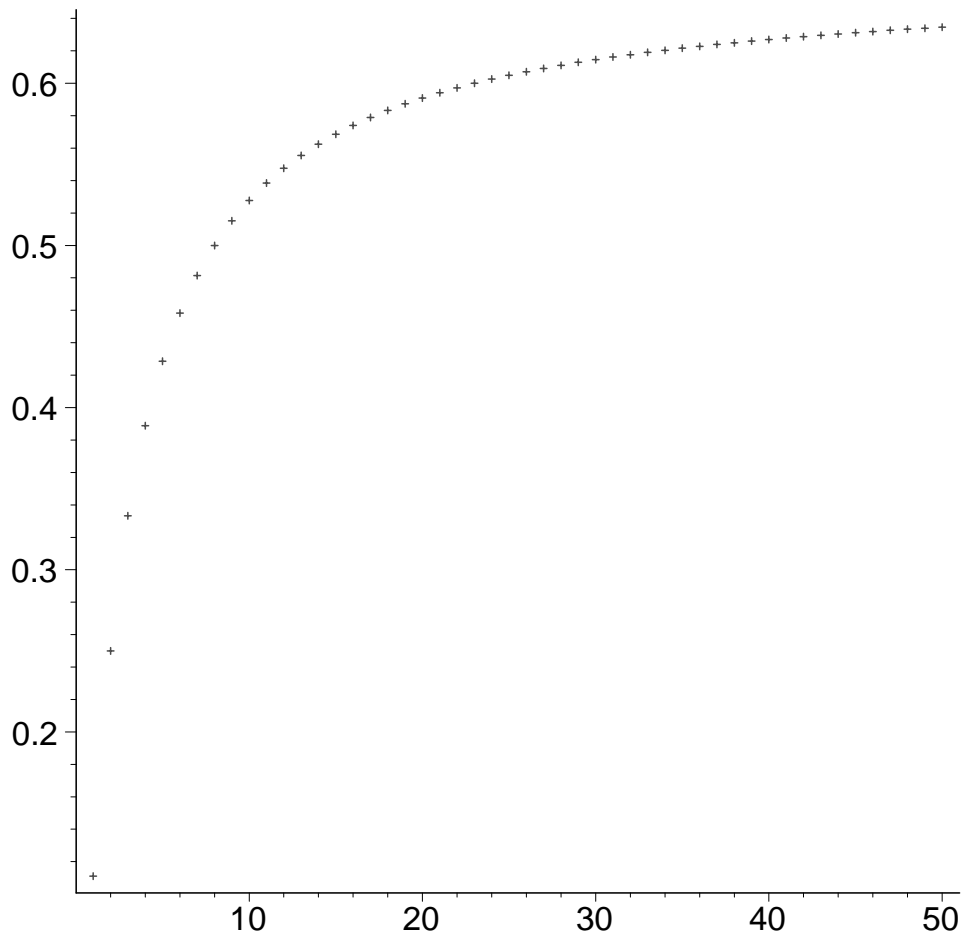
Chapter 8.1

Limits of Sequences

```
> b:=n->(2*n-1)/(3*n+6); disp:=seq([n,b(n)],n=1..50): n:='n':
```

$$b := n \rightarrow \frac{2n-1}{3n+6}$$

```
> plot([disp], style=point);
```



```
> Limit(b(n),n=infinity); value(%);
```

$$\lim_{n \rightarrow \infty} \frac{2n-1}{3n+6}$$

$$\frac{2}{3}$$

Chapter 8.2
Series

```
> Sum(a(n),n=5..9); value(%);  
>
```

$$\sum_{n=5}^9 \frac{1}{n^2}$$

$$\frac{737641}{6350400}$$

```
> Sum(a(n),n=1..infinity); value(%);
```

$$\sum_{n=1}^{\infty} \frac{1}{n^2}$$

$$\frac{1}{6} \pi^2$$

```
> a:=n->1/n; Sum(a(n),n=1..infinity); value(%);
```

$$a := n \rightarrow \frac{1}{n}$$

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

```
> a:=n->r^n; Sum(a(n),n=0..infinity); value(%);
```

$$a := n \rightarrow r^n$$

$$\sum_{n=0}^{\infty} r^n$$

$$-\frac{1}{r-1}$$

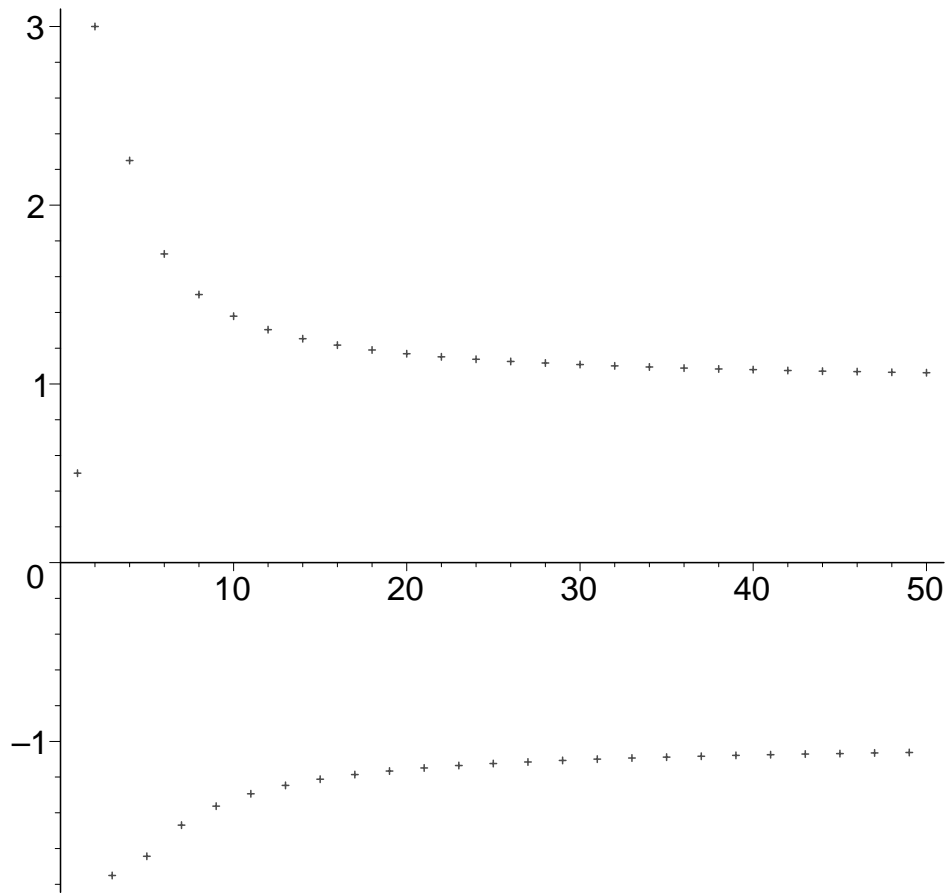
Chapter 8.7
Exercises

Exercise 1

```
> a:=n->(2+(-1)^n*n^2)/(n^2-3*n+4); disp:=seq([n,a(n)],n=1..50):  
n:='n':
```

$$a := n \rightarrow \frac{2 + (-1)^n n^2}{n^2 - 3n + 4}$$

```
> plot([disp], style=point);
```



```
> Limit(a(n),n=infinity); value(%);
```

$$\lim_{n \rightarrow \infty} \frac{2 + (-1)^n n^2}{n^2 - 3n + 4}$$

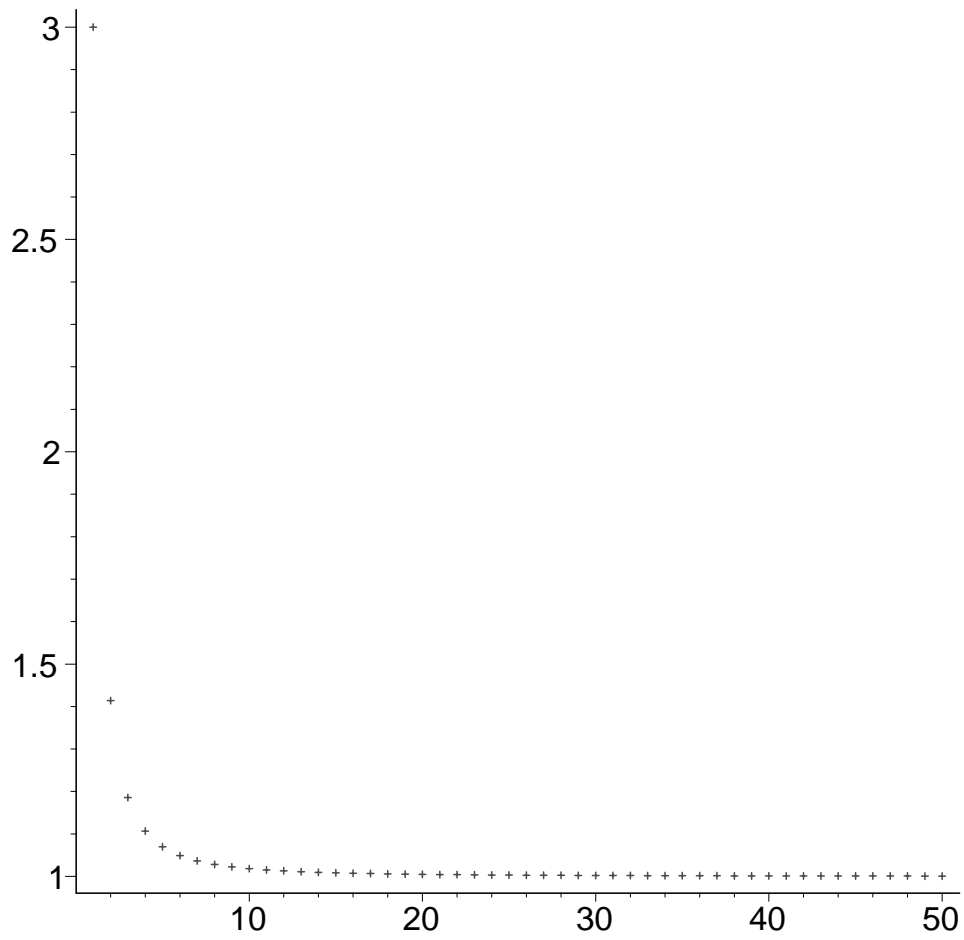
-1 .. 1

```
[ Exercise 5
```

```
> a:=n->(1+2/n)^(1/n); disp:=seq([n,a(n)],n=1..50): n:='n':
```

$$a := n \rightarrow \left(1 + \frac{2}{n}\right)^{\left(\frac{1}{n}\right)}$$

```
> plot([disp], style=point);
```



```
> Limit(a(n),n=infinity); value(%);
```

$$\lim_{n \rightarrow \infty} \left(1 + \frac{2}{n}\right)^{\left(\frac{1}{n}\right)}$$

1

[Exercise 6

```
> a:=n->1/3^n;
```

$$a := n \rightarrow \frac{1}{3^n}$$

```
> Sum(a(n),n=1..infinity); value(%);
```

$$\sum_{n=1}^{\infty} \frac{1}{3^n}$$

```

[ > s:=n->Sum(a(j),j=1..n);
[ > s(2); value(%);
[ > with(plots):
[ > disp1:=seq([n,s(n)],n=1..50):
[ > disp2:=seq([n,a(n)],n=1..50):
[ > plot1:=plot([disp1],style=point, colour=blue):
[ > plot2:=plot([disp2],style=point):
[ > display([plot1,plot2]);

```

$$\frac{1}{2}$$

$$s := n \rightarrow \sum_{j=1}^n a(j)$$

$$\sum_{j=1}^2 \frac{1}{3^j} = \frac{4}{9}$$

