Lösungen

```
Remove["Global`*"]
```

1

```
z = 3 + 4 I
```

$3 + 4\,i$

a

```
Conjugate[z]
```

$3 - 4\,i$

```
z*Conjugate[z]
```

25

b

```
Abs[z]
```

5

c

```
z^2
```

$-7 + 24\,i$

d

```
1 / z
```

$\frac{3}{25} - \frac{4\,i}{25}$

e

```
Abs[z] E^(I Arg[z])
```

$5\,e^{i\,\text{ArcTan}\left[\frac{4}{3}\right]}$

```
Abs[z] E^(I Arg[z])//N
```

```
3. + 4. i
```

f

```
1 / Abs[z]
```

$$\frac{1}{5}$$

g

```
z Conjugate[z]
```

```
25
```

h

```
Conjugate[z] / Abs[z^2]
```

$$\frac{3}{25} - \frac{4\,i}{25}$$

i

```
Abs[Conjugate[z]]
```

```
5
```

2

```
z1 = 1 - I; z2 = -1 + 2 I;
```

a

```
z1 z2
```

```
1 + 3 i
```

b

```
z1 / z2
```

$$-\frac{3}{5} - \frac{i}{5}$$

c

```
Abs[z1 / z2]
```

$$\sqrt{\frac{2}{5}}$$

d

```
(z1 + z2) / z2
```

$$\frac{2}{5} - \frac{i}{5}$$

e

```
(2 z2 + z1) / (4 z2)
```

$$\frac{7}{20} - \frac{i}{20}$$

f

```
z1^2 z2^3
```

$$-4 - 22\,i$$

3

```
Remove[z]
```

```
z1 = -1 - I
```

$$-1 - i$$

a

```
Solve[z^2 == z1, {z}]
```

$$\left\{\left\{z \to -\sqrt{-1-i}\right\}, \left\{z \to \sqrt{-1-i}\right\}\right\}$$

b

```
Solve[z^3 == z1, {z}]
```

$$\{\{z \to (-1-i)^{1/3}\}, \{z \to -(-1)^{1/3}\,(-1-i)^{1/3}\}, \{z \to (-1)^{2/3}\,(-1-i)^{1/3}\}\}$$

c

```
Solve[z^4 == z1, {z}]
```

$$\{\{z \to -(-1-i)^{1/4}\}, \{z \to -i\,(-1-i)^{1/4}\}, \{z \to i\,(-1-i)^{1/4}\}, \{z \to (-1-i)^{1/4}\}\}$$

d

```
Solve[z^5 == z1, {z}]
```

$$\{\{z \to (-1-i)^{1/5}\}, \{z \to -(-1)^{1/5}\,(-1-i)^{1/5}\},$$
$$\{z \to (-1)^{2/5}\,(-1-i)^{1/5}\}, \{z \to -(-1)^{3/5}\,(-1-i)^{1/5}\}, \{z \to (-1)^{4/5}\,(-1-i)^{1/5}\}\}$$

4

```
Solve[x^2 + x + 1 == 0, {x}]
```

$$\{\{x \to -(-1)^{1/3}\}, \{x \to (-1)^{2/3}\}\}$$

5

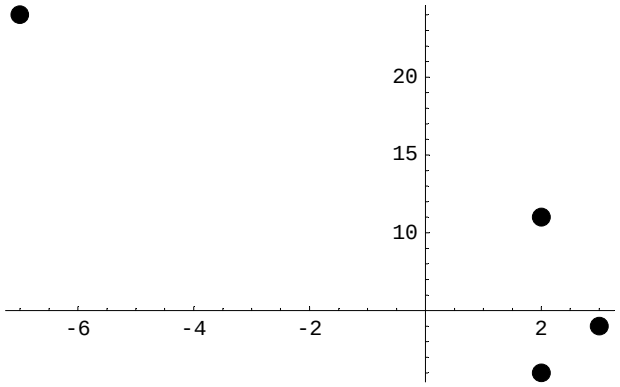
a

```
z1 = 2 + I
```

$$2 + i$$

```
Show[Graphics[
   Append[{PointSize[0.03]}, Map[Point, Table[{Re[z1^k], Im[z1^k]}, {k, 1, 4}]]]
  ]];
```

```
ListPlot[Table[{Re[z1^k], Im[z1^k]}, {k, 1, 4}], PlotStyle → {PointSize[.03]}];
```



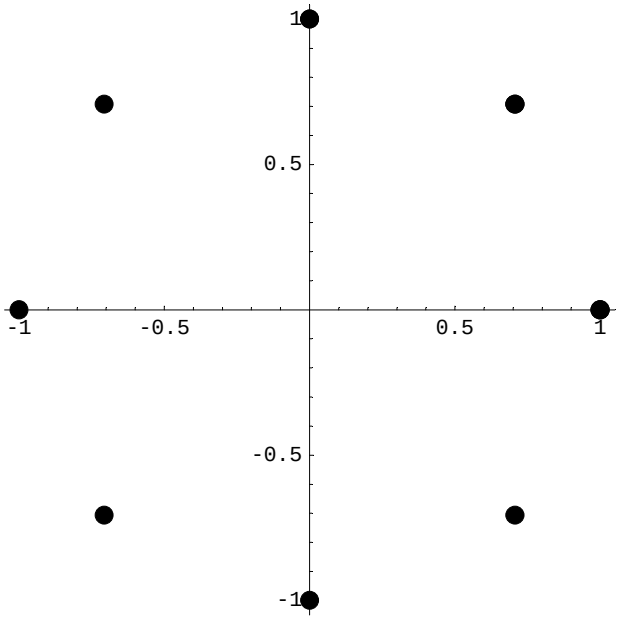
b

```
z2 = 1 / Sqrt[2] (1 + I)
```

$$\frac{1+i}{\sqrt{2}}$$

n=10

```
ListPlot[Table[{Re[z2^k], Im[z2^k]}, {k, 0, 10}],
  PlotStyle → {PointSize[.03]}, AspectRatio -> Automatic];
```



n=40

```
ListPlot[Table[{Re[z2^k], Im[z2^k]}, {k, 0, 40}],
  PlotStyle → {PointSize[.015]}, AspectRatio -> Automatic];
```