Lösungen

1

```
m1 = Solve[(z - 2 + I)^4 == 2 + I, {z}] // Flatten // N
```

```
{z → 0.785361 - 1.14143 i, z → 2.14143 - 2.21464 i,
 z → 1.85857 + 0.214639 i, z → 3.21464 - 0.858575 i}
```

```
f[x_] := x[[2]]; (* Test *) f[Rule[c, b]]
```

```
b
```

```
m2 = Map[f, m1]
```

```
{0.785361 - 1.14143 i, 2.14143 - 2.21464 i, 1.85857 + 0.214639 i, 3.21464 - 0.858575 i}
```

```
m3 = Map[Abs, m2]
```

```
{1.38551, 3.08064, 1.87093, 3.32732}
```

2

```
3 E^(2 z) /. z -> I Pi
```

```
3
```

```
(3 E^(2 z) /. z -> I Pi + 1) // Simplify
```

```
3 e^2
```

```
(Cos[z] + Sin[z] /. z → I Pi ) // N
```

```
11.592 + 11.5487 i
```

```
(Cos[z] - Sin[z] /. z → -I Pi ) // N
```

```
11.592 + 11.5487 i
```

3

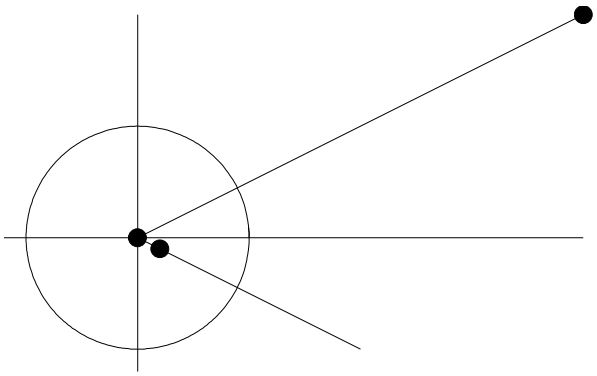
```
z = 4 + 2 I
```

```
4 + 2 i
```

```
w = 1 / z
```

$$\frac{1}{5} - \frac{i}{10}$$

```
Show[Graphics[{PointSize[0.03], Point[{Re[z], Im[z]}], Point[{Re[w], Im[w]}],
    Point[{0, 0}], Circle[{0, 0}, 1], Line[{{-1.2, 0}, {4, 0}}],
    Line[{{0, -1.2}, {0, 2}}], Line[{{0, 0}, {Re[z], Im[z]}}],
    Line[{{0, 0}, 10 {Re[w], Im[w]}}]}], AspectRatio → Automatic];
```



```
(4 + 2 I) (2 - 4 I) / (4 - 3 I)
```

4

```
(4 + 2 I) (2 - 4 I) / (3 + 4 I)
```

$-4\,i$

4

```
Remove[z, w]
```

```
z1 = 1; z2 = -1; z3 = 2 - I; z4 = 2 + I; z5 = -2 + I; z6 = -2 - I;
(z - z1) (z - z2) (z - z3) (z - z4) (z - z5) (z - z6) // Expand
```

$-25 + 31\,z^2 - 7\,z^4 + z^6$

```
((z - z1) (z - z2) (z - z3) (z - z4) (z - z5) (z - z6) // Expand) /. z → w^(1 / 2)
```

$-25 + 31\,w - 7\,w^2 + w^3$

```
Solve[% == 0, {w}]
```

$\{\{w \to 1\}, \{w \to 3 - 4\,i\}, \{w \to 3 + 4\,i\}\}$

5

```
a = (z^12 - 1) / (2 z - 2) // Apart
```

$$\frac{1}{2} + \frac{z}{2} + \frac{z^2}{2} + \frac{z^3}{2} + \frac{z^4}{2} + \frac{z^5}{2} + \frac{z^6}{2} + \frac{z^7}{2} + \frac{z^8}{2} + \frac{z^9}{2} + \frac{z^{10}}{2} + \frac{z^{11}}{2}$$

```
a /. z → 1
```

6

```
a /. z → I
```

```
0
```

```
a /. z → -1
```

```
0
```

```
a /. z → -I
```

```
0
```