```
> restart;
```

Facitliste til 21. kursusgang

Opgave 425

```
> solve(z^2-(5+5*I)*z+13*I=0,z);
```

$$3+2\,\mathrm{I},\ 2+3\,\mathrm{I} \tag{1}$$

Opgave 426

```
> solve(I*z^2-(2+3*I)*z+1+5*I=0,z);
```

$$2-3\,\mathrm{I},\ 1+\mathrm{I} \tag{2}$$

Opgave 427(a)

```
> solve((z+1)^2=3+4*I,z);
```

$$1+\mathrm{I},\ -3-\mathrm{I} \tag{3}$$

Opgave 427(b)

```
> r:=solve((z+1)^4=3+4*I,z):
> for k from 1 to 4 do evalc(r[k]) end do;
```

$$-1+\frac{1}{2}\sqrt{-4+2\sqrt{5}}-\frac{1}{2}\,\mathrm{I}\sqrt{4+2\sqrt{5}}$$

$$-1-\frac{1}{2}\sqrt{-4+2\sqrt{5}}+\frac{1}{2}\,\mathrm{I}\sqrt{4+2\sqrt{5}}$$

$$-1+\frac{1}{2}\sqrt{4+2\sqrt{5}}+\frac{1}{2}\,\mathrm{I}\sqrt{-4+2\sqrt{5}}$$

$$-1-\frac{1}{2}\sqrt{4+2\sqrt{5}}-\frac{1}{2}\,\mathrm{I}\sqrt{-4+2\sqrt{5}} \tag{4}$$

Opgave 429

```
> r2:=solve(z^2-4*I*z-1+4*I=0,z);
```

$$r2 := 1,\ -1+4\,\mathrm{I} \tag{5}$$

```
> solve(z^2=r2[1],z);
```

$$1,\ -1 \tag{6}$$

```
> r3:=solve(z^2=r2[2],z):
> evalc(r3[1]);
```

$$\frac{1}{2}\sqrt{-2+2\sqrt{17}}+\frac{1}{2}\,\mathrm{I}\sqrt{2+2\sqrt{17}} \tag{7}$$

```
> evalc(r3[2]);
```

$$-\frac{1}{2}\sqrt{-2+2\sqrt{17}}-\frac{1}{2}\,\mathrm{I}\sqrt{2+2\sqrt{17}} \tag{8}$$

Opgave 430(a)

```
> r4:=solve(z^3=1,z):
> for k from 1 to 3 do evalc(r4[k]) end do;
```

$$1$$

$$-\frac{1}{2}+\frac{1}{2}\,\mathrm{I}\sqrt{3}$$

(9)

$$-\frac{1}{2}-\frac{1}{2}\,\mathrm{I}\sqrt{3} \tag{9}$$

Opgave 430 (b)

```
> r5:=solve(z^3=I,z):
> for k from 1 to 3 do evalc(r5[k]) end do;
```

$$\frac{1}{2}\,\mathrm{I}+\frac{1}{2}\sqrt{3}$$

$$\frac{1}{2}\,\mathrm{I}-\frac{1}{2}\sqrt{3}$$

$$-\mathrm{I} \tag{10}$$

Bemærk, at der findes en let måde at løse (b) på baseret på løsningen til (a)!

Opgave 431 (a)

```
> r6:=solve(z^4=-4,z):
> for k from 1 to 4 do evalc(r6[k]) end do;
```

$$-1+\mathrm{I}$$

$$-1-\mathrm{I}$$

$$1+\mathrm{I}$$

$$1-\mathrm{I} \tag{11}$$

Opgave 431 (b)

Først rodudtrykket som Maple kan findes. Forventes ikke fundet!

```
> r7:=solve(z^3=1+I):
> for k from 1 to 3 do evalc(simplify(convert(evalc(r7[k]),
  radical))) end do;
```

$$\frac{1}{4}\,2^{(2/3)}+\frac{1}{4}\,2^{(2/3)}\sqrt{3}+\mathrm{I}\left(\frac{1}{4}\,2^{(2/3)}\sqrt{3}-\frac{1}{4}\,2^{(2/3)}\right)$$

$$-\frac{1}{2}\,2^{(2/3)}+\frac{1}{2}\,\mathrm{I}\,2^{(2/3)}$$

$$\frac{1}{4}\,2^{(2/3)}-\frac{1}{4}\,2^{(2/3)}\sqrt{3}+\mathrm{I}\left(-\frac{1}{4}\,2^{(2/3)}\sqrt{3}-\frac{1}{4}\,2^{(2/3)}\right) \tag{12}$$

Løsning i formen givet i HEJ, med automatisk omskrivning fra Maple.

```
> for j from 0 to 2 do 2^(1/6)*(cos(Pi/12+2*Pi*j/3)+I*sin
  (Pi/12+2*Pi*j/3)) end do;
```

$$2^{(1/6)}\left(\cos\left(\frac{1}{12}\,\pi\right)+\mathrm{I}\sin\left(\frac{1}{12}\,\pi\right)\right)$$

$$2^{(1/6)}\left(-\frac{1}{2}\sqrt{2}+\frac{1}{2}\,\mathrm{I}\sqrt{2}\right)$$

$$2^{(1/6)}\left(-\cos\left(\frac{5}{12}\,\pi\right)-\mathrm{I}\sin\left(\frac{5}{12}\,\pi\right)\right) \tag{13}$$

Opgave 432 (1)

```
> r1:=solve(z^4+16=0,z):
> for k from 1 to 4 do r1[k] end do;
```

$$\sqrt{2}+\mathrm{I}\sqrt{2}$$

$$-\sqrt{2} + \mathrm{I}\sqrt{2}$$
$$-\sqrt{2} - \mathrm{I}\sqrt{2}$$
$$\sqrt{2} - \mathrm{I}\sqrt{2} \quad (14)$$

Opgave 432 (2)

```
> factor(z^4+16,sqrt(2));
```

$$\left(z^2 - 2\,z\sqrt{2} + 4\right)\left(z^2 + 2\,z\sqrt{2} + 4\right) \quad (15)$$