

Define the complex numbers

```
->      z:17/4 + 2/5*%i;
```

$$(z) \quad \frac{2\%i}{5} + \frac{17}{4}$$

```
->      w:23/4 - 1/2*%i;
```

$$(w) \quad \frac{23}{4} - \frac{\%i}{2}$$

```
->      z*w;
```

$$(\% \text{ o5}) \quad \left( \frac{23}{4} - \frac{\%i}{2} \right) \left( \frac{2\%i}{5} + \frac{17}{4} \right)$$

```
->      z/w;
```

$$(\% \text{ o14}) \quad \frac{\frac{2\%i}{5} + \frac{17}{4}}{\frac{23}{4} - \frac{\%i}{2}}$$

The modulus of zw is,

```
->      float(abs(z*w));
```

$$(\% \text{ o13}) \quad 24.63812150408387$$

The principal argument of zw is,

```
->      float(carg(z*w));
```

$$(\% \text{ o12}) \quad 0.0071028739533513935$$

The modulus of z/w is,

```
->      float(abs(z/w));
```

$$(\% \text{ o10}) \quad 0.739605898809272$$

The principal argument of z/w is,

```
->      float(carg(z/w));
```

$$(\% \text{ o11}) \quad 0.1805795513053216$$

B)

```
(% i1) solns:solve(4*z^6 + 20*z^5 + 53*z^4 + 100*z^3 + 148*z^2 + 120*z + 75 = 0, z);
```

```
(solns)
```

$$\left[ z = -\left(\frac{2\%i+1}{2}\right), z = \frac{2\%i-1}{2}, z = -\left(\sqrt{3}\%i\right), z = \sqrt{3}\%i, z = -\%i-2, z = \%i-2 \right]$$

So the solutions are  $-(2i+1)/(2)$ ,  $(2i-1)/(2)$ ,  $-\sqrt{3}i$ ,  $\sqrt{3}i$ ,  $-i-2$  and  $i-2$

```
(% i7) v:makelist(rhs(solns[k]), k, 1, length(solns));
```

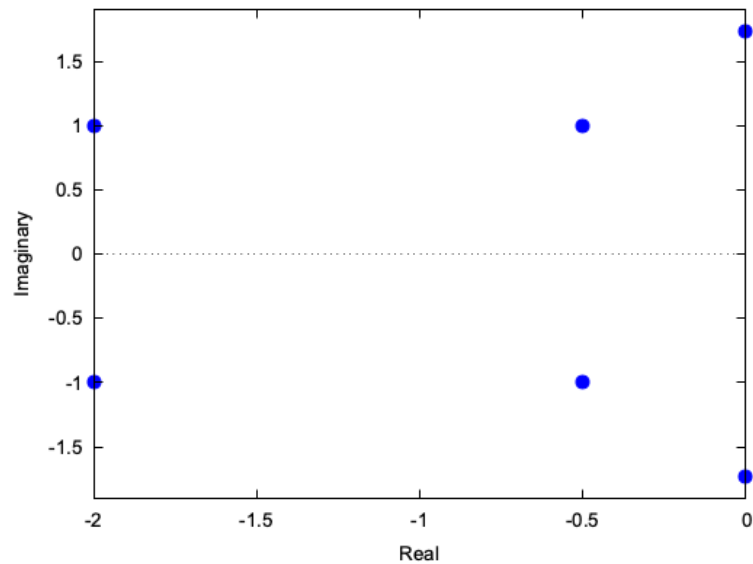
$$(v) \quad \left[ -\left(\frac{2\%i+1}{2}\right), \frac{2\%i-1}{2}, -\left(\sqrt{3}\%i\right), \sqrt{3}\%i, -\%i-2, \%i-2 \right]$$

```
(% i8) pts:makelist([realpart(v[k]), imagpart(v[k])], k, 1, length(solns));
```

$$(pts) \quad \left[ \left[ -\left(\frac{1}{2}\right), -1 \right], \left[ -\left(\frac{1}{2}\right), 1 \right], \left[ 0, -\sqrt{3} \right], \left[ 0, \sqrt{3} \right], \left[ -2, -1 \right], \left[ -2, 1 \right] \right]$$

```
(% i13) wxplot2d([discrete,pts], [style,points], [xlabel,"Real"], [ylabel,"Imaginary"]);
```

```
(% t13)
```



```
(% o13)
```