```
> f:=x->(x^3*sin(x))/(x^4+5*x^2+4);
```

$$f := x \rightarrow \frac{x^3 \sin(x)}{x^4 + 5x^2 + 4}$$

Spoctu integral z teto funkce od minus-nekonecna do plus- nekonecna pomoci Maple.

```
> int((x^3*sin(x))/(x^4+5*x^2+4),x=-infinity..infinity);
```

$$-\frac{1}{3}\pi\cosh(1) + \frac{4}{3}\pi\cosh(2) - \frac{4}{3}\pi\sinh(2) + \frac{1}{3}\pi\sinh(1)$$

Vycislim tuto hodnotu

```
> evalf(%);
```

$$0.181648673$$

```
>
```

Budu integrovat pres pulkruznici.Integral pres oblouk pulkruznice se bude blizit nule s rostoucim polomerem pulkruznice, jak plyne z odhadu pri pouziti vhodne integracni funkce .Integral pres pulkruznici ,ktery spoctu reziduovou vetou, tedy bude roven integralu pres "usecku pulkruznice" od od minus- nekonecna do plus- nekonecna.

```
>
```

```
>
>
> poly:=[solve(z^4+5*z^2+4=0,z)];
```

$$poly := [2\,I, -2\,I, I, -I]$$

```
>
```

```
> Rezfunkce:=z->(z^3*exp(I*z))/(4*z^3+10*z);
```

$$Rezfunkce := z \rightarrow \frac{z^3\,\mathbf{e}^{(z\,I)}}{4\,z^3 + 10\,z}$$

```
> Rezidua:=[seq(Rezfunkce(poly[i]),i=1..4)];
```

$$Rezidua := \left[\frac{2}{3}\,\mathbf{e}^{(-2)}, \frac{2}{3}\,\mathbf{e}^2, -\frac{1}{6}\,\mathbf{e}^{(-1)}, -\frac{1}{6}\,\mathbf{e}\right]$$

Tedy rezidum v 2I je (2/3)/e^2 a reziduum v I je -1*e/6.Podle reziduove vety plati I=Im[2Pi*I*(rez(2I)+rez(I))].

```
> Im(2*Pi*I*(Rezidua[1]+Rezidua[3]));
```

$$2\,\pi\left(\frac{2}{3}\,\mathbf{e}^{(-2)} - \frac{1}{6}\,\mathbf{e}^{(-1)}\right)$$

```
> evalf(%);
```

$$0.1816486587$$

>

Zaver:Vypocet reziduvou vetou se shoduje s pocatecnim vypoctem.