```
> interface(version);
  FunctionAdvisor(BesselI);
```

Classic Worksheet Interface, Maple 16.02, Windows, Nov 18 2012, Build ID 788210

```
The system is unable to compute the "series" for BesselI
The symmetries for BesselI are unknown to the FunctionAdvisor
BesselI belongs to the subclass "Bessel_related" of the class "0F1" and so, in principle, it can be related to
various of the 26 functions of those classes - see FunctionAdvisor( "Bessel_related" ); and FunctionAdvisor( "0
F1" );
The system is unable to compute the "asymptotic_expansion" for BesselI
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$$\text{table}([\text{"symmetries"} = [\ ],\ \text{"series"} = (\ ),\ \text{"singularities"} = [\text{BesselI}(a, z),\ a = \infty + \infty I,\ z = \infty + \infty I],\ \text{"classify\_function"} = (\text{Bessel\_related}, \text{0F1}),\ \text{"sum\_form"} = \Bigg($$

$$\left[\text{BesselI}(a, z) = \sum_{\_k1=0}^{\infty} \frac{z^{(a+2\_k1)}}{2^{(a+2\_k1)}\,\Gamma(1+a+\_k1)\,\Gamma(\_k1+1)},\ \text{And}(a::\text{Not}(\text{negint}))\right],$$

$$\left[\text{BesselI}(a, z) = \sum_{\_k1=0}^{\infty} \frac{z^{(-a+2\_k1)}}{2^{(-a+2\_k1)}\,\Gamma(1-a+\_k1)\,\Gamma(\_k1+1)},\ \text{And}(a::\text{negint})\right]\Bigg),\ \text{"calling\_sequence"} = \text{BesselI}(a, z),\ \text{"asymptotic\_expansion"} = (\ ),$$

$$\text{"identities"} = \left[\text{BesselI}(a, z) = -\frac{2(a-1)\,\text{BesselI}(a-1, z)}{z} + \text{BesselI}(a-2, z),\ \text{BesselI}(a, z) = \frac{2(a+1)\,\text{BesselI}(a+1, z)}{z} + \text{BesselI}(a+2, z)\right],\ \text{"integral\_form"}$$

$$= \Bigg(\left[\text{BesselI}(a, z) = \int_0^1 \frac{\frac{1}{4} z^a (1-\_t1)^{(-1/2+a)}\, \_t1^{(-1/2+a)}\, \mathbf{e}^{(\sqrt{z^2}\,(-1+2\_t1))}\, 2^{(2+2a)}}{\Gamma\left(\frac{1}{2}+a\right) 2^a \sqrt{\pi}}\, d\_t1,\ \text{with no restrictions on } (a, z)\right],$$

$$\left[\text{BesselI}(a, z) = \int_{-\pi}^{\pi} \frac{1}{2}\, \frac{z^a}{(z\,I)^a\, \pi\, \mathbf{e}^{(a\_k1\,I + z\sin(\_k1))}}\, d\_k1,\ \text{And}(a::\text{integer})\right],$$

$$\left[\text{BesselI}(a, z) = \int_0^{\infty} -\frac{2 z^a \sin\left(-z\cosh(\_k1)\,I + \frac{\pi a}{2}\right)\cosh(a\_k1)}{(z\,I)^a\, \pi}\, d\_k1,\ \text{And}(z::\text{imaginary})\right],$$

$$\left[\text{BesselI}(a, z) = \int_0^{\infty} -\frac{\sin(\pi a)\, z^a}{(z\,I)^a\, \pi\, \mathbf{e}^{((\_k1 + z\sinh(\_k1))\,I)}}\, d\_k1 + \int_0^{\pi} \frac{z^a \cos(a\_k1 - z\sin(\_k1)\,I)}{(z\,I)^a\, \pi}\, d\_k1,\ \text{And}(\Im(z) < 0)\right],$$

$$\left[\text{BesselI}(a, z) = \int_0^1 \frac{\frac{1}{4} z^a\, \_t1^{(-1/2+a)} (1-\_t1)^{(-1/2+a)}\, \mathbf{e}^{(z(-1+2\_t1))}\, 2^{(2+2a)}}{\Gamma\left(\frac{1}{2}+a\right) 2^a \sqrt{\pi}}\, d\_t1,\ \text{And}\left(0 < \frac{1}{2} + \Re(a)\right)\right]\Bigg),$$

$$\text{"definition"} = \left[\text{BesselI}(a, z) = \frac{z^a\, \text{hypergeom}\left([\ ], [1+a], \frac{z^2}{4}\right)}{\Gamma(1+a)\, 2^a},\ \text{with no restrictions on } (a, z)\right],$$

$$\text{"differentiation\_rule"} = \left(\frac{\partial}{\partial z} \text{BesselI}(a, f(z)) = \left(\text{BesselI}(a+1, f(z)) + \frac{a\,\text{BesselI}(a, f(z))}{f(z)}\right)\left(\frac{d}{dz} f(z)\right)\right),$$

$$\text{"describe"} = (\text{BesselI} = \text{Modified Bessel function of the first kind}),\ \text{"branch\_points"} = [\text{BesselI}(a, z),\ \text{And}(a::\text{Not}(\text{integer}),\ z \in [0, \infty + \infty I])],$$

$$\text{"special\_values"} = \left[\text{BesselI}\left(\frac{-1}{2}, z\right) = \frac{\sqrt{2}\cosh(z)}{\sqrt{z}\sqrt{\pi}},\ \text{BesselI}\left(\frac{1}{2}, z\right) = \frac{\sqrt{2}\sinh(z)}{\sqrt{z}\sqrt{\pi}},\ \text{BesselI}(0, 0) = 1\right],$$

$$\text{"DE"} = \left[f(z) = \text{BesselI}(a, z),\ \left[\frac{d^2}{dz^2} f(z) = -\frac{\frac{d}{dz} f(z)}{z} + \frac{(z^2 + a^2)\, f(z)}{z^2}\right]\right],$$

$$\text{"branch\_cuts"} = [\text{BesselI}(a, z),\ \text{And}(a::\text{Not}(\text{integer}),\ z < 0)]$$

$$])$$