```
> restart;
> # Backwards Differentiation Formula
> sigma0:=w->w^s;
```

$$\sigma 0 := w \to w^{s}$$

```
> s:=6;
```

$$s := 6$$

```
> logseries:=convert(subs(v=1/w-1,series(log(1+v),v,s+1)),polynom);
```

$$logseries := \frac{1}{w} - 1 - \frac{1}{2}\left(\frac{1}{w} - 1\right)^{2} + \frac{1}{3}\left(\frac{1}{w} - 1\right)^{3} - \frac{1}{4}\left(\frac{1}{w} - 1\right)^{4} + \frac{1}{5}\left(\frac{1}{w} - 1\right)^{5} - \frac{1}{6}\left(\frac{1}{w} - 1\right)^{6}$$

```
> rho0:=-simplify(sigma0(w)*logseries);
```

$$\rho 0 := -6\,w^{5} + \frac{15}{2}\,w^{4} - \frac{20}{3}\,w^{3} - \frac{6}{5}\,w + \frac{1}{6} + \frac{15}{4}\,w^{2} + \frac{49}{20}\,w^{6}$$

```
> beta:=1/coeff(rho0,w,s);
```

$$\beta := \frac{20}{49}$$

```
> sigma:=beta*sigma0(w);
```

$$\sigma := \frac{20}{49}\,w^{6}$$

```
> rho:=beta*rho3;
```

$$\rho := -\frac{120}{49}\,w^{5} + \frac{150}{49}\,w^{4} - \frac{400}{147}\,w^{3} - \frac{24}{49}\,w + \frac{10}{147} + \frac{75}{49}\,w^{2} + w^{6}$$

```
> R:=[solve(rho=0)];
```

$$R := [1, \text{RootOf}(147\,_Z^{5} - 213\,_Z^{4} + 237\,_Z^{3} - 163\,_Z^{2} + 62\,_Z - 10, index = 1), \text{RootOf}(147\,_Z^{5} - 213\,_Z^{4} + 237\,_Z^{3} - 163\,_Z^{2} + 62\,_Z - 10, index = 2), \text{RootOf}(147\,_Z^{5} - 213\,_Z^{4} + 237\,_Z^{3} - 163\,_Z^{2} + 62\,_Z - 10, index = 3), \text{RootOf}(147\,_Z^{5} - 213\,_Z^{4} + 237\,_Z^{3} - 163\,_Z^{2} + 62\,_Z - 10, index = 4), \text{RootOf}(147\,_Z^{5} - 213\,_Z^{4} + 237\,_Z^{3} - 163\,_Z^{2} + 62\,_Z - 10, index = 5)]$$

```
> seq(abs(evalf(R[i])),i=1..s);
```

1., 0.4061232669, 0.4740348577, 0.8633802679, 0.8633802679, 0.4740348577