

Pensieve header: Computing ν to degree 6 following <http://katlas.math.toronto.edu/drorbn/bbs/show?shot=Danco-120430-110839.jpg>.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-05\\beta5.0"];
<< betaCalculus.m

Clear[ħ];
$PerturbativeDegree = 6;
βSimplify[expr_] := Replace[
  Series[Normal[expr], {ħ, 0, $PerturbativeDegree}],
  sd_SeriesData -> MapAt[Expand, sd, 3]
];
βCollect[B[ω_, μ_]] := B[
  βSimplify[ω],
  βSimplify[μ]
];
{V1, C1, sol} = Get["SolutionToDegree6-120501.m"];
ϕ1 = ϕ[V1]
```

$$\begin{pmatrix} 1 \\ t[1] \\ t[2] \\ t[3] \end{pmatrix} = \begin{pmatrix} 1 \\ -\frac{c_3 \hbar}{8} + \left(\frac{1}{720} c_1^2 c_3 - \frac{1}{576} c_1 c_2 c_3 - \frac{1}{960} c_2^2 c_3 - \frac{5 c_1 c_2^2}{4608} + \frac{251 c_2 c_2^2}{23040} + \frac{19 c_3^3}{2880} \right) \hbar^3 + \left(\frac{179 c_1^3 c_2 c_3}{172800} + \frac{1531 c_1^2 c_2^2 c_3}{460800} \right) \hbar^3 + \left(\frac{37 c_1^4 c_3}{153600} + \frac{4597 c_1^3 c_2 c_3}{4838400} + \frac{3731 c_1^2 c_2^2 c_3}{1536000} \right) \hbar^3 \\ \frac{c_2 \hbar}{24} + \left(\frac{13 c_1^2 c_2}{5760} + \frac{1}{192} c_1 c_2^2 - \frac{7 c_2^3}{5760} + \frac{17 c_1 c_2 c_3}{2880} - \frac{11 c_2^2 c_3}{1440} - \frac{7 c_2 c_2^2}{1920} \right) \hbar^3 + \left(\frac{13 c_1^4 c_2}{138240} + \frac{151 c_1^3 c_2^2}{967680} + \frac{11 c_1^2 c_2^3}{36864} + \frac{13 c_1^3 c_2 c_3}{172800} + \frac{1531 c_1^2 c_2^2 c_3}{460800} + \frac{3731 c_1 c_2^2 c_3}{1536000} + \frac{4597 c_1^3 c_2 c_3}{4838400} + \frac{37 c_1^4 c_3}{153600} \right) \hbar^3 \end{pmatrix}$$

```
{
  ϕ1 // ds[2] // dm[3, 2, 2] // dm[2, 1, 1] ,
  ϕ1 // ds[2] // dm[3, 2, 2] // dm[2, 1, 1] // Inverse
}
```

$$\left\{ \left(1 + \frac{1}{24} c_1^2 \hbar^2 + \frac{c_1^4 \hbar^4}{1920} + \frac{c_1^5 \hbar^5}{322560} + O[\hbar]^7 \right), \left(1 - \frac{1}{24} c_1^2 \hbar^2 + \frac{7 c_1^4 \hbar^4}{5760} - \frac{31 c_1^5 \hbar^5}{967680} + O[\hbar]^7 \right) \right\}$$

$$\left(1 + \frac{1}{24} c_1^2 \hbar^2 + \frac{c_1^4 \hbar^4}{1920} + \frac{c_1^5 \hbar^5}{322560} + O[\hbar]^7 \right) \left(1 - \frac{1}{24} c_1^2 \hbar^2 + \frac{7 c_1^4 \hbar^4}{5760} - \frac{31 c_1^5 \hbar^5}{967680} + O[\hbar]^7 \right)$$

$$1 + O[\hbar]^7$$

$$\text{Series}\left[\sqrt{\frac{\text{Sinh}[x/2]}{x/2}}, \{x, 0, 6\}\right]$$

$$1 + \frac{x^2}{48} + \frac{x^4}{23040} + \frac{x^6}{1548288} + O[x]^7$$

$$\text{Series}\left[\frac{\text{Sinh}[x/2]}{x/2}, \{x, 0, 6\}\right]$$

$$1 + \frac{x^2}{24} + \frac{x^4}{1920} + \frac{x^6}{322560} + O[x]^7$$