```
> restart:  ## case 1342,1423
> eee:=proc(n,m) option remember: if n=1 then if m=1 then return(1):
  fi: return(0): fi: if n=2 then if m=1 then return(1): fi: if m=2
  then return(q): fi: return(0): fi: if n=3 then if m=1 then
  return(1+2*q): fi: if m=2 then return(2*q): fi: if m=3 then
  return(q^2): fi: return(0): fi: if m>0 and m<n+1 then
  return(simplify(add(ddd(n,ii,m),ii=1..n)-q*add(eee(n-a,m)*add(ddd(
  a,ii,1),ii=1..a),a=1..n-m))): fi: return(0): end:
> ddd:=proc(n,i,m) option remember: if n=1 then if i=1 and m=1 then
  return(1): fi: return(0): fi: if n=2 then if i=2 and m=1 then
  return(q): fi: if m=1 and i=1 then return(1): fi: if m=2 and i=2
  then return(q): fi: return(0): fi: if n=3 then if m=1 and i=1 then
  return(1+q): fi: if i=1 and m=2 then return(q): fi: if i=2 and m=1
  then return(2*q): fi: if i=3 and m=1 then return(q+q^2): fi:  if
  i=3 and m=2 then return(q+q^2): fi:  if i=3 and m=3 then
  return(q^2): fi: return(0): fi:  if m>1 and m<n+1 and i=n then
  return(simplify(add(q*ddd(n-1,ii,m-1),ii=1..n-1))): fi: if m=1 and
  n>1 and i=n then return(simplify(add(q*ddd(n-1,ii,1),ii=1..n-1))):
  fi: if i=n-m and n>=3 and m>=2 then
  return(simplify(add(q*ddd(n-2,ii,m-1),ii=1..n-2)+add(q*ddd(n-1,jj,
  m),jj=1..n-m-1))): fi: if i=n-1 and m=1 and n>=3 then
  return(simplify(add(q*ddd(n-2,ii,1),ii=1..n-2)+add(q*ddd(n-1,jj,1)
  ,jj=1..n-2))): fi: if i>0 and i<n-m and n>m+1 and m>0 then
  return(simplify(ddd(n-1,i,m)+add(q*ddd(n-2,ii,n-i-1),ii=1..n-2)+ad
  d(q*ddd(n-1,jj,m),jj=1..i-1)+add(add(q*eee(jj-2-a,jj-i-1)*ddd(n-jj
  +a+1,a+1,m),a=0..i-1),jj=i+2..n-m))): fi: return(0): end:
> NN:=14:
> DD:=(x,v,w)->add(add(add(ddd(n,i,m)*v^i*w^(m-1)*x^n,m=1..n),i=1..n
  ),n=1..NN):
  EE:=(x,v)->add(add(eee(n,m)*v^(m-1)*x^n,m=1..n),n=1..NN):
> DD1:=(x,v,w)->add(add(add(ddd(n,i,m)*v^i*w^(m-1)*x^n,i=1..n-m-1),m
  =1..n-1),n=1..NN):
  DD2:=(x,v,w)->add(add(ddd(n,n-m,m)*v^(n-m)*w^(m-1)*x^n,m=1..n-1),n
  =1..NN):
  DD3:=(x,v,w)->add(add(ddd(n,n,m)*v^n*w^(m-1)*x^n,m=1..n),n=1..NN):
>
> ##define the function A(x,v)=DD(x,v,1)
> AAAw1:=(x,v)->1/2*v*x*(-2*q^3*v^2*x^3+4*q^2*v^2*x^3+2*q^2*v^2*x^2-
  2*q*v^2*x^3+2*q^2*v*x^2-3*q*v^2*x^2+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2
  *x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*x+2*v^2*x^2-3*q*v*x-v^2*x-3*v*x^2-
  (4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v-(4*q^2
  *v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*x+2*v*x+v-x)/(
  q*v*x-v*x-1)/(q^2*v*x^2-q*v*x^2-q*x+v*x-v-x+1);
```

$$AAAw1 := (x, v) \to \frac{1}{2} v\, x\, (-2\, q^3\, v^2\, x^3 + 4\, q^2\, v^2\, x^3 + 2\, q^2\, v^2\, x^2 - 2\, q\, v^2\, x^3 + 2\, q^2\, v\, x^2 - 3\, q\, v^2\, x^2 + \sqrt{4\, q^2\, v^2\, x^2 - 4\, q\, v^2\, x^2 + v^2\, x^2 - 4\, q\, v\, x - 2\, v\, x + 1}\; q\, v\, x + 2\, v^2\, x^2 - 3\, q\, v\, x - v^2\, x - 3\, v\, x^2 - \sqrt{4\, q^2\, v^2\, x^2 - 4\, q\, v^2\, x^2 + v^2\, x^2 - 4\, q\, v\, x - 2\, v\, x + 1}\; v - \sqrt{4\, q^2\, v^2\, x^2 - 4\, q\, v^2\, x^2 + v^2\, x^2 - 4\, q\, v\, x - 2\, v\, x + 1}\; x + 2\, v\, x + v - x) \Big/ ((q\, v\, x - v\, x - 1)\, (q^2\, v\, x^2 - q\, v\, x^2 - q\, x + v\, x - v - x + 1))$$

```
> zz1:=factor(coeff(AAAw1(x,v),(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*
  q*v*x-2*v*x+1)^(1/2),1))*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*
  x-2*v*x+1)^(1/2)+factor(coeff(AAAw1(x,v),(4*q^2*v^2*x^2-4*q*v^2*x^
  2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2),0));
```

$$zz1 := \frac{v\, x\, (q\, v\, x - v - x) \sqrt{4\, q^2\, v^2\, x^2 - 4\, q\, v^2\, x^2 + v^2\, x^2 - 4\, q\, v\, x - 2\, v\, x + 1}}{2\, (q\, v\, x - v\, x - 1)\, (q^2\, v\, x^2 - q\, v\, x^2 - q\, x + v\, x - v - x + 1)} - v\, x\, (2\, q^3\, v^2\, x^3 - 4\, q^2\, v^2\, x^3 - 2\, q^2\, v^2\, x^2 + 2\, q\, v^2\, x^3 - 2\, q^2\, v\, x^2 + 3\, q\, v^2\, x^2 - 2\, v^2\, x^2 + 3\, q\, v\, x + v^2\, x + 3\, v\, x^2 - 2\, v\, x - v + x) \Big/ (2\, (q\, v\, x - v\, x - 1)\, (q^2\, v\, x^2 - q\, v\, x^2 - q\, x + v\, x - v - x + 1))$$

```
>
> simplify(taylor(-DD(x,v,w)+DD1(x,v,w)+DD2(x,v,w)+DD3(x,v,w),x,NN))
  ; eq1:=-FDD(x,v,w)+FDD1(x,v,w)+FDD2(x,v,w)+FDD3(x,v,w);
```

$$0$$

$$eq1 := -\mathrm{FDD}(x, v, w) + \mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w) + \mathrm{FDD3}(x, v, w)$$

```
>
> simplify(taylor(-EE(x,v)+DD(x,1,v)-q*EE(x,v)*DD(x,1,0),x,NN));
  eq2:=-FEE(x,v)+FDD(x,1,v)-q*FEE(x,v)*FDD(x,1,0);
```

$$\mathrm{O}(x^{14})$$

$$eq2 := -\mathrm{FEE}(x, v) + \mathrm{FDD}(x, 1, v) - q\, \mathrm{FEE}(x, v)\, \mathrm{FDD}(x, 1, 0)$$

```
>
> simplify(taylor(-DD3(x,v,w)+add(ddd(n,n,1)*v^n*x^n,n=1..NN)+add(ad
  d(ddd(n,n,m)*v^n*w^(m-1)*x^n,m=2..n),n=1..NN),x,8));
  simplify(taylor(-DD3(x,v,w)+q*x*v*DD(v*x,1,0)+v*x+q*v*w*x*add(add(
  add(ddd(n,ii,m)*v^n*w^(m-1)*x^n,ii=1..n),m=1..n),n=1..NN),x,8));
  simplify(taylor(-DD3(x,v,w)+q*x*v*DD(v*x,1,0)+v*x+q*v*w*x*DD(v*x,1
  ,w),x,8));
  eq3:=-FDD3(x,v,w)+q*x*v*FDD(v*x,1,0)+v*x+q*v*w*x*FDD(v*x,1,w);
```

$$0$$

$$\mathrm{O}(x^8)$$

$$\mathrm{O}(x^8)$$

$$eq3 := -\mathrm{FDD3}(x, v, w) + q\, x\, v\, \mathrm{FDD}(v\, x, 1, 0) + v\, x + q\, v\, w\, x\, \mathrm{FDD}(v\, x, 1, w)$$

```
>
```

```
>
> simplify(taylor(-DD2(x,v,w)+add(ddd(n,n-1,1)*v^(n-1)*x^n,n=1..NN)+
add(add(ddd(n,n-m,m)*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+add((q*add(ddd(n-2,ii,1),ii=1..n
-2)+q*add(ddd(n-1,j,1),j=1..n-2))*v^(n-1)*x^n,n=1..NN)
+add(add((q*add(ddd(n-2,ii,m-1),ii=1..n-2)+q*add(ddd(n-1,j,m),j=1.
.n-1-m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v*x^2*add(add(ddd(n,ii,1),ii=1
..n)*v^n*x^n,n=1..NN)+q*x*add(add(ddd(n,j,1),j=1..n)*v^(n)*x^n,n=1
..NN)-q*x*add(ddd(n,n,1)*v^(n)*x^n,n=1..NN)+add(add((q*add(ddd(n-2
,ii,m-1),ii=1..n-2)+q*add(ddd(n-1,j,m),j=1..n-1-m))*v^(n-m)*w^(m-1
)*x^n,m=2..n-1),n=1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v*x^2*add(add(ddd(n,ii,1),ii=1
..n-2)*v^n*x^n,n=1..NN)+q*v*x^2*add(ddd(n,n-1,1)*v^n*x^n,n=1..NN)+
q*v*x^2*add(ddd(n,n,1)*v^n*x^n,n=1..NN)+q*x*add(add(ddd(n,j,1),j=1
..n)*v^(n)*x^n,n=1..NN)-q*x*add(ddd(n,n,1)*v^(n)*x^n,n=1..NN)+add(
add((q*add(ddd(n-2,ii,m-1),ii=1..n-2)+q*add(ddd(n-1,j,m),j=1..n-1-
m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v^2*x^3+q*v*x^2*add(add(ddd(n,
ii,1),ii=1..n-2)*v^n*x^n,n=1..NN)+q*v*x^2*add(ddd(n,n-1,1)*v^n*x^n
,n=1..NN)+q^2*v^2*x^3*DD(v*x,1,0)
+q*x*add(add(ddd(n,j,1),j=1..n)*v^(n)*x^n,n=1..NN)-q*x*add(ddd(n,n
,1)*v^(n)*x^n,n=1..NN)+add(add((q*add(ddd(n-2,ii,m-1),ii=1..n-2)+q
*add(ddd(n-1,j,m),j=1..n-1-m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..
NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v^2*x^3+q*v^3*x^4+q*v*x^2*add(
add(ddd(n,ii,1),ii=1..n-2)*v^n*x^n,n=1..NN)+q^2*v*x^2*add((add(ddd
(n-2,ii,1),ii=1..n-2)+add(ddd(n-1,j,1),j=1..n-2))*v^n*x^n,n=1..NN)
+q^2*v^2*x^3*DD(v*x,1,0)
+q*x*add(add(ddd(n,j,1),j=1..n)*v^(n)*x^n,n=1..NN)-q*x*add(ddd(n,n
,1)*v^(n)*x^n,n=1..NN)+add(add((q*add(ddd(n-2,ii,m-1),ii=1..n-2)+q
*add(ddd(n-1,j,m),j=1..n-1-m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..
NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2-q*v*x^2+q*v*x^2*DD(v*x,1,0)-q*v*
x^2*(q*v^2*x^2*DD(v*x,1,0)+q*x*v*DD(v*x,1,0)-q^2*v^2*x^2*DD(v*x,1,
0))-q^2*v^2*x^3*DD(v*x,1,0)+q^2*v^3*x^4*DD(v*x,1,0)+q^2*v^2*x^3*(D
D(v*x,1,0)-q*v*x*DD(v*x,1,0))+q^2*v^2*x^3*DD(v*x,1,0)+q*x*DD(v*x,1
,0)-q^2*v*x^2*DD(v*x,1,0)+add(add((q*add(ddd(n-2,ii,m-1),ii=1..n-2
)+q*add(ddd(n-1,j,m),j=1..n-1-m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=
1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2-q*v*x^2+q*v*x^2*DD(v*x,1,0)+q*x*
DD(v*x,1,0)-q^2*v*x^2*DD(v*x,1,0)
+add(add((q*add(ddd(n-2,ii,m-1),ii=1..n-2)+q*add(ddd(n-1,j,m),j=1.
```

```
.n-1-m))*v^(n-m)*w^(m-1)*x^n,m=2..n-1),n=1..NN),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v*x^2*DD(v*x,1,0)+q*x*DD(v*x,1
,0)-q^2*v*x^2*DD(v*x,1,0)  +q*w*x^2*DD(v*x,1,w/v)
+q*v*x*(1/v*DD1(v*x,1,w/v)+DD2(x,v,w))+0*add(add(add(ddd(n,j,m)*v^
(n-m)*w^(m-1)*x^n,j=1..n-m),m=1..n-1),n=1..NN)
-q*x*(DD(v*x,1,0)-q*v*x*DD(v*x,1,0)),x,8));
simplify(taylor(-DD2(x,v,w)+v*x^2+q*v*x^2*DD(v*x,1,0)+q*w*x^2*DD(v
*x,1,w/v)+q*x*(DD1(v*x,1,w/v)+v*DD2(x,v,w)),x,NN));
eq4:=-FDD2(x,v,w)+v*x^2+q*v*x^2*FDD(v*x,1,0)+q*w*x^2*FDD(v*x,1,w/v
)+q*x*(FDD1(v*x,1,w/v)+v*FDD2(x,v,w));
```

$$0$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^{14})$$

$$eq4 := -\mathrm{FDD2}(x, v, w) + v\,x^2 + q\,v\,x^2\,\mathrm{FDD}(v\,x, 1, 0) + q\,w\,x^2\,\mathrm{FDD}\left(v\,x, 1, \frac{w}{v}\right) + q\,x\left(\mathrm{FDD1}\left(v\,x, 1, \frac{w}{v}\right) + v\,\mathrm{FDD2}(x, v, w)\right)$$

```
>
> simplify(taylor(-DD1(x,v,w)+add(add(add(ddd(n,i,m)*v^i*w^(m-1)*x^n
,i=1..n-m-1),m=n-1..n-1),n=1..NN)+add(add(add((ddd(n-1,i,m)+q*add(
ddd(n-2,ii,n-i-1),ii=1..n-2)+q*add(ddd(n-1,j,m),j=1..i-1)+q*add(ad
d(eee(j-2-a,j-1-i)*ddd(n-j+a+1,a+1,m),a=0..i-1),j=i+2..n-m))*v^i*w
^(m-1)*x^n,i=1..n-m-1),m=1..n-2),n=1..NN),x,8));
simplify(taylor(-DD1(x,v,w)+x*(DD1(x,v,w)+DD2(x,v,w))
+q*v*x^2/(1-w)*add(add(add(ddd(n,ii,i),ii=1..n)*v^(n-i)*(1-w^i)*x^
n,i=1..n),n=1..NN)
+q*v*x/(1-v)*add(add(add(ddd(n,j,m)*(v^j-v^(n-m))*w^(m-1)*x^n,j=1.
.n-1-m),m=1..n-1),n=1..NN)
+q*x^2*add(add(add(add(add(eee(j-a,j+1-i)*ddd(n+m-j+a+1,a+1,m)*v^i
*w^(m-1)*x^(n+m),i=a+1..j),a=0..j-1),j=1..n),n=0..NN),m=1..NN),x,8
));
```

$$O(x^8)$$

$$O(x^8)$$

```
> simplify(taylor(-DD1(x,v,w)+x*(DD1(x,v,w)+DD2(x,v,w))+q*x^2/(1-w)*
(DD(v*x,1,1/v)-w*DD(v*x,1,w/v))+q*v*x/(1-v)*(DD1(x,v,w)-1/v*DD1(v*
x,1,w/v))+q*x^2*add(add(add(add(add(eee(a,i)*v^(-i),i=1..a)*ddd(n,
j,m)*v^(j+a)*w^(m-1)*x^(n+a-1),n=j+m..NN),j=1..NN),a=1..NN),m=1..N
N),x,8));
simplify(taylor(-DD1(x,v,w)+x*(DD1(x,v,w)+DD2(x,v,w))+q*x^2/(1-w)*
(DD(v*x,1,1/v)-w*DD(v*x,1,w/v))+q*v*x/(1-v)*(DD1(x,v,w)-1/v*DD1(v*
x,1,w/v))+q*x*add(add(add(add(add(eee(a,i)*v^(-i),i=1..a)*ddd(n-a,
j,m)*v^(j+a)*w^(m-1)*x^n,n=j+m+a..NN),j=1..NN),a=1..NN),m=1..NN),x
,8));
simplify(taylor(-DD1(x,v,w)+x*(DD1(x,v,w)+DD2(x,v,w))+q*x^2/(1-w)*
(DD(v*x,1,1/v)-w*DD(v*x,1,w/v))+q*v*x/(1-v)*(DD1(x,v,w)-1/v*DD1(v*
x,1,w/v))+q*x*add(add(add(eee(a,i)*v^(-i),i=1..a)*add(add(ddd(n-a,
j,m)*v^(j+a)*w^(m-1),j=1..n-a-m),m=1..n-1-a)*x^n,a=1..n-2),n=3..NN
),x,8));
factor(taylor(-DD1(x,v,w)+x*(DD1(x,v,w)+DD2(x,v,w))+q*x^2/(1-w)*(D
D(v*x,1,1/v)-w*DD(v*x,1,w/v))+q*v*x/(1-v)*(DD1(x,v,w)-1/v*DD1(v*x,
1,w/v))+q*x*EE(v*x,1/v)/v*(DD2(x,v,w)+DD1(x,v,w)),x,NN));
eq5:=-FDD1(x,v,w)+x*(FDD1(x,v,w)+FDD2(x,v,w))+q*x^2/(1-w)*(FDD(v*x
,1,1/v)-w*FDD(v*x,1,w/v))+q*v*x/(1-v)*(FDD1(x,v,w)-1/v*FDD1(v*x,1,
w/v))+q*x*FEE(v*x,1/v)/v*(FDD2(x,v,w)+FDD1(x,v,w));
```

$$O(x^8)$$

$$O(x^8)$$

$$O(x^8)$$

$$O(x^{14})$$

$$eq5 := -\mathrm{FDD1}(x, v, w) + x\,(\mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w)) + \frac{q\,x^2\left(\mathrm{FDD}\left(v\,x, 1, \frac{1}{v}\right) - w\,\mathrm{FDD}\left(v\,x, 1, \frac{w}{v}\right)\right)}{1-w} + \frac{q\,v\,x\left(\mathrm{FDD1}(x, v, w) - \frac{\mathrm{FDD1}\left(v\,x, 1, \frac{w}{v}\right)}{v}\right)}{1-v} + \frac{q\,x\,\mathrm{FEE}\left(v\,x, \frac{1}{v}\right)(\mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w))}{v}$$

```
>
> ###Assume P1 , AAAw1(x,v)=R(x,v)
> simplify(taylor(v*x+AAAw1(x,v)-DD(x,v,0),x,15));
```

$$O(x^{15})$$

```
> ###Assume P2
```

```
> BB0:=x->-1/2*(x+(4*q^2*x^2-4*q*x^2-4*q*x+x^2-2*x+1)^(1/2)-1)/q/x/(
-q*x+x+1)-1;
simplify(taylor(-DD1(x,1,w)/DD2(x,1,w)+BB0(x),x,NN+1));
```

$$BB0 := x \to -\frac{1}{2}\frac{x+\sqrt{4\,q^2\,x^2-4\,q\,x^2-4\,q\,x+x^2-2\,x+1}-1}{q\,x\,(-q\,x+x+1)}-1$$

$$\mathrm{O}(x^{13})$$

```
> ##formulas:
> FEEv:=(x,v)->simplify(rationalize(-x*(2*q*x+(4*q^2*x^2-4*q*x^2-4*q
*x+x^2-2*x+1)^(1/2)-x-3)/(q*x-x-1)/(2*q*v*x-2*q*x-(4*q^2*x^2-4*q*x
^2-4*q*x+x^2-2*x+1)^(1/2)+x-1)/(1+q*(1/2*x*(-2*q^3*x^3+4*q^2*x^3+4
*q^2*x^2-2*q*x^3-3*x^2*q+(4*q^2*x^2-4*q*x^2-4*q*x+x^2-2*x+1)^(1/2)
*q*x-x^2-3*q*x-(4*q^2*x^2-4*q*x^2-4*q*x+x^2-2*x+1)^(1/2)-(4*q^2*x^
2-4*q*x^2-4*q*x+x^2-2*x+1)^(1/2)*x+1)/(q*x-x-1)/(q^2*x^2-q*x^2-q*x
)+x)))): FEEv(x,v); simplify(taylor(FEEv(x,v)-EE(x,v),x,14));
```

$$-\frac{2\,q\,v\,x-2\,q\,x+\sqrt{4\,q^2\,x^2-4\,q\,x^2-4\,q\,x+x^2-2\,x+1}+x-1}{2\,q\,(q\,v^2\,x-2\,q\,v\,x+v\,x-v+2)}$$

$$\mathrm{O}(x^{14})$$

```
> FINDD2:=(x,v,w)->1/simplify(simplify(rationalize(1/simplify(-x*(q*
v*x*(1/2*v*x*(-2*q^3*v^3*x^3+4*q^2*v^3*x^3+4*q^2*v^2*x^2-2*q*v^3*x
^3-3*q*v^2*x^2+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)
^(1/2)*q*v*x-v^2*x^2-3*q*v*x-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*
q*v*x-2*v*x+1)^(1/2)-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*
v*x+1)^(1/2)*v*x+1)/(q*v*x-v*x-1)/(q^2*v^2*x^2-q*v^2*x^2-q*v*x)+v*
x)-v*x^2*(2*q*v*x+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x
+1)^(1/2)-v*x-3)/(q*v*x-v*x-1)/(2*q*w*x-2*q*v*x-(4*q^2*v^2*x^2-4*q
*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+v*x-1)*q*w-(4*q^3*v^3*x^3+
2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^
2*x^2-8*q^2*v^3*x^3-3*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2
*v*x+1)^(1/2)*q*v^2*x^2-10*q^2*v^2*x^2+5*q*v^3*x^3-4*(4*q^2*v^2*x^
2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*x+(4*q^2*v^2*x^2-
4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^2*x^2+9*q*v^2*x^2-v^3
*x^3+2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v
*x+8*q*v*x-v^2*x^2+2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*
v*x+1)^(1/2)-2)*v*x/(q*v*x-v*x-1)/(2*q*w*x-2*q*v*x-(4*q^2*v^2*x^2-
4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+v*x-1)*q+v*x)/(q*v*x-1)
))+1)-1): FINDD2(x,v,w);
simplify(taylor(FINDD2(x,v,w)-DD2(x,v,w),x,NN));
```

$$-4\,v\,x^2 \Big/ \Big(-4\,q^2\,v\,w\,x^2+4\,q\,w\,v\,x^2+2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q\,w\,x$$
$$-w\,v\,x^2-\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;w\,x+4\,q\,v\,x+2\,q\,w\,x-2\,v\,x+w\,x$$

$$-2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}-2)$$

$$O(x^{14})$$

```
> FINDD1:=(x,v,w)->1/simplify(simplify(rationalize(1/simplify(1/8*v*
(1-v+28*q^4*v^3*x^3-42*q^3*v^2*x^2+13*q^2*v*x+56*q^3*v^4*x^3-32*q^
2*v^4*x^3+9*q*v^4*x^3-34*q^2*v^3*x^2+3*q*v^3*x^2-3*q*v^2*x-v*x-v^2
*x^2+v^3*x^3+4*q^2-3*q*v^2*x^2+q-v^4*x^3+v^3*x^2-8*q*v^3*x^3+(4*q^
2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^3*x^2+18*(4
*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^3*x^
2-7*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^
3*x^2-6*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*
q*v^2*x-8*v*q^2-v*q-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v
*x+1)^(1/2)*v^2*x^2-4*q^2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v
*x-2*v*x+1)^(1/2)+8*q^2*v*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v
*x-2*v*x+1)^(1/2)-q*v*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2
*v*x+1)^(1/2)+16*q^5*v^4*x^3-8*q^5*v^3*x^3-48*q^4*v^4*x^3-40*q^4*v
^3*x^2+20*q^4*v^2*x^2+68*q^3*v^3*x^2+32*q^3*v^2*x-16*q^3*v*x-18*q^
2*v^2*x+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*
q-13*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2
*v^2*x^2+6*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/
2)*q*v^2*x^2+8*q^4*v^3*x^2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*
v*x-2*v*x+1)^(1/2)-4*q^4*v^2*x^2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^
2-4*q*v*x-2*v*x+1)^(1/2)-20*q^3*v^3*x^2*(4*q^2*v^2*x^2-4*q*v^2*x^2
+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)-16*q^3*v^2*x*(4*q^2*v^2*x^2-4*q*v^
2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+8*q^3*v*x*(4*q^2*v^2*x^2-4*q*
v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+20*q^2*v^2*x*(4*q^2*v^2*x^2
-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)-38*q^3*v^3*x^3+25*q^2*
v^3*x^3+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+
2*q*v*x+26*q^2*v^2*x^2+5*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*
x-2*v*x+1)^(1/2)*q*v*x+v^2*x-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*
q*v*x-2*v*x+1)^(1/2)*v+12*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v
*x-2*v*x+1)^(1/2)*q^3*v^2*x^2-13*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^
2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v*x)*x*(-1+v-8*q^4*v^4*x^4+20*q^3*v^4
*x^4-18*q^2*v^4*x^4+7*q*v^4*x^4-12*q^3*v^3*x^4+13*q^2*v^3*x^4-6*q*
v^3*x^4+4*q^4*v^3*x^4-8*q^3*v^4*x^3+12*q^2*v^4*x^3-6*q*v^4*x^3+8*q
^2*v^3*x^2-2*q*v^3*x^2+2*v^2*x^2+q*v^2*x^2+x-3*q*v^2*x^3+(4*q^2*v^
2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^2*x^3-v^4*x^4+v
^4*x^3-v^3*x^2+v^3*x^4-v^2*x^3+4*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^
2-4*q*v*x-2*v*x+1)^(1/2)*q^3*v^3*x^3-8*(4*q^2*v^2*x^2-4*q*v^2*x^2+
v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^3*x^3+5*(4*q^2*v^2*x^2-4*q*v^
2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^3*x^3-2*(4*q^2*v^2*x^2-4*
q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^3*v^2*x^3+8*q*v^3*x^3-(
4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^3*x^3+(
```

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4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^3*x^2-(
4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*x+4*(4*
q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^3*x^2
-4*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^3
*x^2+3*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q
^2*v*x^2-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)
*q^2*w*x^2-2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(
1/2)*q*v^2*x+q*x^2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*
x+1)^(1/2)*w-2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)
^(1/2)*q^3*v^2*w*x^3+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*
v*x+1)^(1/2)*q^3*v*w*x^3-2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*
v*x-2*v*x+1)^(1/2)*q^2*v^2*w*x^2+4*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*
x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v*w*x^2+(4*q^2*v^2*x^2-4*q*v^2*x^2+
v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^2*w*x^2+(4*q^2*v^2*x^2-4*q*v^2*
x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*w*x+q*v^2*w*x^4-q*v^3*x^4*w
+4*q^4*v^3*w*x^4-2*q^4*v^2*w*x^4-8*q^3*v^3*w*x^4+4*q^3*v^3*w*x^3+5
*q^3*v^2*w*x^4+5*q^2*v^3*w*x^4-4*q^2*v^3*w*x^3-4*q^2*v^2*w*x^4+5*q
^3*v*w*x^3+q*v^3*w*x^3-4*q^2*v^2*w*x^2-5*q^2*v*w*x^3+9*q^2*v^2*w*x
^3-q*v^2*w*x^3+6*q^2*v*w*x^2-10*q^3*v^2*w*x^3+q*v*w*x^2-v*x^2-q*w*
v*x-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v^2*
x^2-3*q^2*w*x^2-q*w*x^2+q*w*x+5*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2
-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^2*x^3-4*(4*q^2*v^2*x^2-4*q*v^2*x^2+v
^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^2*x^3-3*(4*q^2*v^2*x^2-4*q*v^2*x
^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*x^2-8*(4*q^2*v^2*x^2-4*q*v^2
*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^2*x^2+7*(4*q^2*v^2*x^2-4
*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^2*x^2+(4*q^2*v^2*x^2
-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v*x+20*q^3*v^3*x^3-26*
q^2*v^3*x^3+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1
/2)+12*q^2*v^2*x^3+3*q^2*v*x^2-12*q^2*v^2*x^2-8*q^3*v^2*x^3+2*(4*q
^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*x-v^2*x-
(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v-(4*q^2
*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*x+q*x+(4*q^2*v
^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*w*x^3-(4*q^2
*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v^2*x^3*w+3*
(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q^2*v^2*
w*x^3-2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*
q^2*v*w*x^3-2*(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^
(1/2)*q*v*w*x^2-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1
)^(1/2)*q*w*x)/q^2/(4*q^5*v^5*w*x^5-2*q^5*v^4*w^2*x^5-2*q^5*v^4*w*
x^5+q^5*v^3*w^2*x^5-12*q^4*v^5*w*x^5+5*q^4*v^4*w^2*x^5+4*q^4*v^5*w
*x^4-2*q^4*v^4*w^2*x^4+7*q^4*v^4*w*x^5-3*q^4*v^3*w^2*x^5+13*q^3*v^
5*w*x^5-4*q^3*v^4*w^2*x^5-4*q^4*v^5*x^4-12*q^4*v^4*w*x^4+7*q^4*v^3
*w^2*x^4-6*q^3*v^5*w*x^4+2*q^3*v^4*w^2*x^4-9*q^3*v^4*w*x^5+3*q^3*v
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^3*w^2*x^5-6*q^2*v^5*w*x^5+q^2*v^4*w^2*x^5+2*q^4*v^4*x^4+5*q^4*v^3
*w*x^4-3*q^4*v^2*w^2*x^4-4*q^3*v^5*w*x^3+10*q^3*v^5*x^4+2*q^3*v^4*
w^2*x^3+20*q^3*v^4*w*x^4-9*q^3*v^3*w^2*x^4+q^2*v^4*w^2*x^4+5*q^2*v
^4*w*x^5-q^2*v^3*w^2*x^5+q*v^5*w*x^5-4*q^3*v^5*x^3-6*q^3*v^4*x^4+q
^3*v^3*w^2*x^3-10*q^3*v^3*w*x^4+5*q^3*v^2*w^2*x^4+12*q^2*v^5*w*x^3
-8*q^2*v^5*x^4-5*q^2*v^4*w^2*x^3-5*q^2*v^4*w*x^4+3*q*v^5*w*x^4-q*v
^4*w^2*x^4-q*v^4*w*x^5+14*q^3*v^4*x^3+7*q^3*v^3*w*x^3-7*q^3*v^2*w^
2*x^3-4*q^2*v^5*w*x^2+4*q^2*v^5*x^3+2*q^2*v^4*w^2*x^2-17*q^2*v^4*w
*x^3+6*q^2*v^4*x^4+8*q^2*v^3*w^2*x^3+4*q^2*v^3*w*x^4-q^2*v^2*w^2*x
^4-11*q*v^5*w*x^3+2*q*v^5*x^4+3*q*v^4*w^2*x^3-5*q*v^4*w*x^4+2*q*v^
3*w^2*x^4-v^5*w*x^4-6*q^3*v^3*x^3-3*q^3*v^2*w*x^3+3*q^3*v*w^2*x^3+
4*q^2*v^5*x^2+12*q^2*v^4*w*x^2-18*q^2*v^4*x^3-7*q^2*v^3*w^2*x^2+6*
q^2*v^3*w*x^3-2*q^2*v^2*w^2*x^3+6*q*v^5*w*x^2+2*q*v^5*x^3-2*q*v^4*
w^2*x^2+23*q*v^4*w*x^3-2*q*v^4*x^4-8*q*v^3*w^2*x^3+2*q*v^3*w*x^4-q
*v^2*w^2*x^4+3*v^5*w*x^3+2*v^4*w*x^4+2*q^2*v^4*x^2-11*q^2*v^3*w*x^
2+10*q^2*v^3*x^3+5*q^2*v^2*w^2*x^2-q^2*v*w^2*x^3-10*q*v^5*x^2-18*q
*v^4*w*x^2+8*q*v^3*w^2*x^2-16*q*v^3*w*x^3+7*q*v^2*w^2*x^3-2*v^5*w*
x^2-2*v^5*x^3-7*v^4*w*x^3-v^3*w*x^4-14*q^2*v^3*x^2+5*q^2*v^2*w*x^2
+q^2*v*w^2*x^2+4*q*v^5*x+2*q*v^4*w*x+16*q*v^4*x^2-2*q*v^3*w^2*x+19
*q*v^3*w*x^2-2*q*v^3*x^3-11*q*v^2*w^2*x^2+4*q*v^2*w*x^3-2*q*v*w^2*
x^3+6*v^5*x^2+5*v^4*w*x^2+4*v^4*x^3+5*v^3*w*x^3+6*q^2*v^2*x^2-q^2*
v*w*x^2-q^2*w^2*x^2-14*q*v^4*x-3*q*v^3*w*x-4*q*v^3*x^2+5*q*v^2*w^2
*x-9*q*v^2*w*x^2+6*q*v*w^2*x^2-4*v^5*x-16*v^4*x^2-3*v^3*w*x^2-2*v^
3*x^3-v^2*w*x^3+10*q*v^3*x+3*q*v^2*w*x-2*q*v^2*x^2-4*q*v*w^2*x+2*q
*v*w*x^2-q*w^2*x^2+16*v^4*x-3*v^3*w*x+14*v^3*x^2-v^2*w*x^2+2*q*v^2
*x-3*q*v*w*x+q*w^2*x-4*v^4+2*v^3*w-22*v^3*x+7*v^2*w*x-4*v^2*x^2+v*
w*x^2-2*q*v*x+q*w*x+10*v^3-5*v^2*w+12*v^2*x-5*v*w*x-8*v^2+4*v*w-2*
v*x+w*x+2*v-w))))): FINDD1(x,v,w);
simplify(taylor(FINDD1(x,v,w)-DD1(x,v,w),x,NN));
```

$$4\,x^3\,v\,(q^2\,v\,x-q\,v\,x-q-1)\Big/(-2+2\,q\,v^2\,x^3-4\,q\,v\,w\,x^3+6\,q\,v^2\,x^2+2\,x$$
$$-v\,w\,x^2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}+3\,q\,w\,v\,x^2+5\,q\,w\,v^2\,x^3+q\,v^2\,w\,x^4$$
$$-2\,v^2\,x^2+2\,v\,x^2+v\,w\,x^3-w\,x^2+w\,x^2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}$$
$$-v^2\,w\,x^3-2\,q^2\,w\,x^2+2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q\,x-3\,q\,w\,x^2$$
$$-2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q^2\,w\,x^2$$
$$-2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q^2\,v\,x^2-4\,q^4\,v^2\,w\,x^4+8\,q^3\,v^2\,w\,x^4$$
$$-5\,q^2\,v^2\,w\,x^4+6\,q^3\,v\,w\,x^3-q^2\,v\,w\,x^3-q\,x^2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;w$$
$$-2\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q^2\,v\,w\,x^2$$
$$-3\sqrt{4\,q^2\,v^2\,x^2-4\,q\,v^2\,x^2+v^2\,x^2-4\,q\,v\,x-2\,v\,x+1}\;q^2\,v\,w\,x^3$$

$$+3\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,qvwx^2$$
$$+2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,q^3vwx^3$$
$$+\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,qvwx^3$$
$$-2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,vx+2qwx+wvx^2$$
$$+2vx^2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,q$$
$$+2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,qwx-8q^2v^2wx^3-6q^2vwx^2$$
$$+4q^3v^2wx^3-2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}$$
$$+2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,x+2qx-6q^2v^2x^3-4q^2v^2x^2+6qvx$$
$$+4q^3v^2x^3-6q^2vx^2+2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,qvx)$$

$$O(x^{14})$$

```
> FINDD3:=(x,v,w)->1/simplify(simplify(rationalize(1/simplify(v*x-q*
v^2*w*x^2*(2*q*v*x+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*
x+1)^(1/2)-v*x-3)/(q*v*x-v*x-1)/(2*q*w*v*x-2*q*v*x-(4*q^2*v^2*x^2-
4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)+v*x-1)+q*v*x*(1/2*v*x*(
-2*q^3*v^3*x^3+4*q^2*v^3*x^3+4*q^2*v^2*x^2-2*q*v^3*x^3-3*q*v^2*x^2
+(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*q*v*x-v
^2*x^2-3*q*v*x-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)
^(1/2)-(4*q^2*v^2*x^2-4*q*v^2*x^2+v^2*x^2-4*q*v*x-2*v*x+1)^(1/2)*v
*x+1)/(q*v*x-v*x-1)/(q^2*v^2*x^2-q*v^2*x^2-q*v*x)+v*x)))):
FINDD3(x,v,w); simplify(taylor(FINDD3(x,v,w)-DD3(x,v,w),x,NN));
```

$$16qv^2x^2\Big/\Big((-4q^2v^2x^2+4qv^2x^2+2\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,qvx$$
$$-v^2x^2-\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}\,vx+4qvx$$
$$-\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}+1)$$
$$(-2qwvx+2qvx-vx+\sqrt{4q^2v^2x^2-4qv^2x^2+v^2x^2-4qvx-2vx+1}+1))$$

$$O(x^{14})$$

```
> FINDD:=(x,v,w)->FINDD1(x,v,w)+FINDD2(x,v,w)+FINDD3(x,v,w);
```

$$FINDD := (x, v, w) \to \mathrm{FINDD1}(x, v, w) + \mathrm{FINDD2}(x, v, w) + \mathrm{FINDD3}(x, v, w)$$

```
> simplify(taylor(FINDD3(x,v,w)+FINDD2(x,v,w)+FINDD1(x,v,w)-DD(x,v,w
),x,NN));
```

$$O(x^{14})$$

```
> ##checking the solution
> eq1;
simplify(-FINDD(x,v,w)+FINDD1(x,v,w)+FINDD2(x,v,w)+FINDD3(x,v,w));
```

$$-\mathrm{FDD}(x, v, w) + \mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w) + \mathrm{FDD3}(x, v, w)$$

$$0$$

```
> eq2;  simplify(-FEEv(x,v)+FINDD(x,1,v)-q*FEEv(x,v)*FINDD(x,1,0));
```

$$-\mathrm{FEE}(x, v) + \mathrm{FDD}(x, 1, v) - q\,\mathrm{FEE}(x, v)\,\mathrm{FDD}(x, 1, 0)$$

$$0$$

```
> eq3;
  simplify(-FINDD3(x,v,w)+q*v*x*FINDD(v*x,1,0)+v*x+q*v*w*x*FINDD(v*x
  ,1,w));
```

$$-\mathrm{FDD3}(x, v, w) + q\,x\,v\,\mathrm{FDD}(v\,x, 1, 0) + v\,x + q\,v\,w\,x\,\mathrm{FDD}(v\,x, 1, w)$$

$$0$$

```
> eq4;
  simplify(-FINDD2(x,v,w)+v*x^2+q*v*x^2*FINDD(v*x,1,0)+q*w*x^2*FINDD
  (v*x,1,w/v)+q*x*(FINDD1(v*x,1,w/v)+v*FINDD2(x,v,w)));
```

$$-\mathrm{FDD2}(x, v, w) + v\,x^2 + q\,v\,x^2\,\mathrm{FDD}(v\,x, 1, 0) + q\,w\,x^2\,\mathrm{FDD}\left(v\,x, 1, \frac{w}{v}\right) + q\,x\left(\mathrm{FDD1}\left(v\,x, 1, \frac{w}{v}\right) + v\,\mathrm{FDD2}(x, v, w)\right)$$

$$0$$

```
> eq5;
  simplify(-FINDD1(x,v,w)+x*(FINDD1(x,v,w)+FINDD2(x,v,w))+q*x^2/(1-w
  )*(FINDD(v*x,1,1/v)-w*FINDD(v*x,1,w/v))+q*v*x/(1-v)*(FINDD1(x,v,w)
  -1/v*FINDD1(v*x,1,w/v))+q*x*FEEv(v*x,1/v)/v*(FINDD1(x,v,w)+FINDD2(
  x,v,w)));
```

$$-\mathrm{FDD1}(x, v, w) + x\,(\mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w)) + \frac{q\,x^2\left(\mathrm{FDD}\left(v\,x, 1, \frac{1}{v}\right) - w\,\mathrm{FDD}\left(v\,x, 1, \frac{w}{v}\right)\right)}{1 - w} + \frac{q\,v\,x\left(\mathrm{FDD1}(x, v, w) - \frac{\mathrm{FDD1}\left(v\,x, 1, \frac{w}{v}\right)}{v}\right)}{1 - v} + \frac{q\,x\,\mathrm{FEE}\left(v\,x, \frac{1}{v}\right)(\mathrm{FDD1}(x, v, w) + \mathrm{FDD2}(x, v, w))}{v}$$

$$0$$

```
> ##P1;
> simplify(v*x+AAAw1(x,v)-FINDD(x,v,0));
```

$$0$$

```
> ##P2
> simplify(-FINDD1(x,1,w)/FINDD2(x,1,w)+BB0(x));
```

$$0$$

```
>
```