```
> restart;
> w:=(1-zeta*theta)*(x-z)^a*x^b*exp(-x);
```

$$w := \left(-\theta\,\zeta + 1\right)\,(x - z)^{a}\,x^{b}\,e^{-x} \tag{1}$$

```
> J:=1;H:=1;A:=0;F:=0;E:=-K;K:=-(C+J)/(a+b+3);C:=(-J*a*z+B*a+B*b+H*
  a+H*b+3*B+3*H)/(a^2+2*a*b+a*z+b^2+5*a+5*b+6);B:=G/(b+1);G:=-z*(J*
  b^2*z+H*a*b+H*b^2+H*b*z+3*J*b*z+H*a+4*H*b+H*z+2*J*z+3*H)/(a^2+2*
  a*b+2*a*z+b^2+b*z+z^2+5*a+5*b+3*z+6);
```

$$J := 1$$

$$H := 1$$

$$A := 0$$

$$F := 0$$

$$E := -K$$

$$K := -\frac{C+1}{a+b+3}$$

$$C := \frac{B\,a + B\,b - a\,z + 3\,B + a + b + 3}{a^2 + 2\,a\,b + a\,z + b^2 + 5\,a + 5\,b + 6}$$

$$B := \frac{G}{b+1}$$

$$G := -\frac{z\left(b^2 z + a\,b + b^2 + 4\,b\,z + a + 4\,b + 3\,z + 3\right)}{a^2 + 2\,a\,b + 2\,a\,z + b^2 + b\,z + z^2 + 5\,a + 5\,b + 3\,z + 6} \tag{2}$$

```
> sigma:=factor(A+B*x+C*x^2+E*x^3+F*x^4);
```

$$\sigma := \frac{(x - z)\,(a\,x + b\,x + b\,z + x\,z + a + b + 3\,x + 3\,z + 3)\,x}{a^2 + 2\,a\,b + 2\,a\,z + b^2 + b\,z + z^2 + 5\,a + 5\,b + 3\,z + 6} \tag{3}$$

```
> (x-z)*collect(numer(%/(x-z)),z,factor)/collect(denom(%),z,factor)
  ;latex(%);
```

$$\frac{(x - z)\,((b + x + 3)\,x\,z + (x + 1)\,(a + b + 3)\,x)}{z^2 + (2\,a + b + 3)\,z + (a + b + 3)\,(a + b + 2)}$$

```
{\frac { \left( x-z \right)  \left(  \left( b+x+3 \right) xz+
\left( x
+1 \right)  \left( a+b+3 \right) x \right) }{{z}^{2}+ \left( 2\,
a+b+3
 \right) z+ \left( a+b+3 \right)  \left( a+b+2 \right) }}
```

```
> tau:=factor(collect(simplify(G+H*x+J*x^2+K*x^3),[x,t],factor));
```

$$\tau := \left(a^2 x^2 + 2\,a\,b\,x^2 - a\,x^3 + 2\,a\,x^2 z + b^2 x^2 - b^2 z^2 - b\,x^3 + b\,x^2 z - x^3 z + x^2 z^2 + a^2 x\right. \tag{4}$$
$$+ 2\,a\,b\,x - a\,b\,z + 5\,a\,x^2 + 2\,a\,x\,z + b^2 x - b^2 z + 5\,b\,x^2 + b\,x\,z - 4\,b\,z^2 - 3\,x^3 + 3\,x^2 z$$
$$\left. + x\,z^2 + 5\,a\,x - a\,z + 5\,b\,x - 4\,b\,z + 6\,x^2 + 3\,x\,z - 3\,z^2 + 6\,x - 3\,z\right) \Big/ \left(a^2 + 2\,a\,b + 2\,a\,z\right.$$
$$\left. + b^2 + b\,z + z^2 + 5\,a + 5\,b + 3\,z + 6\right)$$

```
> collect(numer(%),[x,z],factor)/collect(denom(%),[x,z],factor);
  latex(%);
```

$$\left((-a - b - z - 3)\,x^3 + \left(z^2 + (2\,a + b + 3)\,z + (a + b + 3)\,(a + b + 2)\right)x^2 + \left(z^2 + (2\,a\right.\right.$$
$$\left.\left. + b + 3)\,z + (a + b + 3)\,(a + b + 2)\right)x - (b + 3)\,(b + 1)\,z^2 - (b + 1)\,(a + b$$
$$\left. + 3)\,z\right) \Big/ \left(z^2 + (2\,a + b + 3)\,z + (a + b + 3)\,(a + b + 2)\right)$$

```
{\frac { \left( -a-b-z-3 \right) {x}^{3}+ \left( {z}^{2}+ \left(
2\,a+
```

```
b+3 \right) z+ \left( a+b+3 \right)  \left( a+b+2 \right)
\right) {x}
^{2}+ \left( {z}^{2}+ \left( 2\,a+b+3 \right) z+ \left( a+b+3
\right)
 \left( a+b+2 \right)  \right) x- \left( b+3 \right)  \left( b+1
 \right) {z}^{2}- \left( b+1 \right)  \left( a+b+3 \right) z}{
{z}^{2}+
 \left( 2\,a+b+3 \right) z+ \left( a+b+3 \right)  \left( a+b+2
 \right) }}
> diff(sigma*w,x)-tau*w:
> collect(factor(expand(%)),[x],factor);
                                  0                                  (5)
```