```
> restart;with(linalg):with(LinearAlgebra):alias(sigma=sigma(z),
  phi=phi(z)):
> S3:=(z*(diff(sigma, z, z))-(diff(sigma, z)))^2+4*(diff(sigma,z))
  ^2*(z*diff(sigma,z)-2*sigma)+4*z*theta[infinity]*diff(sigma,z)-
  z^2*(z*diff(sigma,z)-2*sigma+2*theta[0]);
```

$$S3 := \left(z\left(\frac{\partial^2}{\partial z^2}\,\sigma\right)-\left(\frac{\partial}{\partial z}\,\sigma\right)\right)^2+4\left(\frac{\partial}{\partial z}\,\sigma\right)^2\left(z\left(\frac{\partial}{\partial z}\,\sigma\right)-2\,\sigma\right)+4\,z\,\theta_\infty\left(\frac{\partial}{\partial z}\,\sigma\right) \tag{1}$$
$$-z^2\left(z\left(\frac{\partial}{\partial z}\,\sigma\right)-2\,\sigma+2\,\theta_0\right)$$

```
> theta[infinity]:=mu^2-(n+1/2)^2;theta[0]:=mu^2+(n+1/2)^2;
```

$$\theta_\infty := \mu^2-\left(n+\frac{1}{2}\right)^2$$

$$\theta_0 := \mu^2+\left(n+\frac{1}{2}\right)^2 \tag{2}$$

```
> n:=2;
```

$$n := 2 \tag{3}$$

```
> phi:=(mu,a)->simplify(LaguerreL(2*a-1,mu-2*a+1,-z)):#phi2:=(a)
  ->simplify((-1)^a/a!*KummerU(-a,mu-a+1,-z));
> tau:=(mu,n)->det(Wronskian([phi(mu,n),seq(diff(phi(mu,n),z$(2*
  j-2))
  ,j=2..n)],z));
```

$$\tau := (\mu, n)\rightarrow linalg{:}\text{-}det\left(linalg{:}\text{-}Wronskian\left(\left[\phi(\mu, n), seq\left(\frac{\partial^{2j-2}}{\partial z^{2j-2}}\,\phi(\mu, n), j=2..n\right)\right], z\right)\right) \tag{4}$$

```
> sigma:=-z^2/4-mu*z+1/8+z*diff(ln(tau(mu,n)),z);
```

$$\sigma := -\frac{1}{4}\,z^2-\mu\,z+\frac{1}{8}+\frac{z\left(-\mu^2-2\,\mu\,z-z^2\right)}{-\frac{1}{3}\,\mu^3+\frac{1}{3}\,\mu-\mu^2 z-\mu z^2-\frac{1}{3}\,z^3} \tag{5}$$

```
> simplify(S3);
```

$$0 \tag{6}$$