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> #  R. Gilmore, February 4, 2009
> #  Topics in Mathematical Physics
> #
> #  Tests of Risch's Algorithm for integrability.
> #  The function g(z) is integrable, according to
> #      the Risch algorithm.
> #  The functions g1(z) and g2(z) are not integrable.
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> g:=2*z*exp(z^2)*log(z)+(1/z)*exp(z^2) +(log(z)-2)/((log(z))^2+z)^2+((2/z)*log(z)+(
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$$g := 2\,z e^{z^2}\ln(z) + \frac{e^{z^2}}{z} + \frac{\ln(z)-2}{\left((\ln(z))^2+z\right)^2} + \left(2\,\frac{\ln(z)}{z} + z^{-1} + 1\right)\left((\ln(z))^2 + z\right)^{-1}$$

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> int(g,z);
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$$e^{z^2}\ln(z) - \frac{\ln(z)}{(\ln(z))^2+z} + \ln\left((\ln(z))^2 + z\right)$$

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> g1:=2*z*exp(z^2)*log(z)+(1/z)*exp(z^2) +(log(z)-1)/((log(z))^2+z)^2+((2/z)*log(z)+
```

$$g1 := 2\,z e^{z^2}\ln(z) + \frac{e^{z^2}}{z} + \frac{\ln(z)-1}{\left((\ln(z))^2+z\right)^2} + \left(2\,\frac{\ln(z)}{z} + z^{-1} + 1\right)\left((\ln(z))^2 + z\right)^{-1}$$

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> int(g1,z);
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$$e^{z^2}\ln(z) - \frac{2\,\ln(z)+z\ln(z)+z}{(4+z)\left((\ln(z))^2+z\right)} + \int \frac{8+22\,z+8\,z^2+18\,z\ln(z)+32\,\ln(z)+2\,z^2\ln(z)+z^3}{z(4+z)^2\left((\ln(z))^2+z\right)}dz$$

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> g2:=2*z*exp(z^2)*log(z)+(1/z)*exp(z^2) +(log(z)-2)/((log(z))^2+z)^2+((2/z)*log(z)+
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$$g2 := 2\,z e^{z^2}\ln(z) + \frac{e^{z^2}}{z} + \frac{\ln(z)-2}{\left((\ln(z))^2+z\right)^2} + \left(2\,\frac{\ln(z)}{z} + z^{-1} - 1\right)\left((\ln(z))^2 + z\right)^{-1}$$

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> int(g2,z);
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$$e^{z^2}\ln(z) - \frac{\ln(z)}{(\ln(z))^2+z} + \int -\frac{z-2\,\ln(z)}{z\left((\ln(z))^2+z\right)}dz$$