Divergent Triangle Integral 1: $I_3^{\{D=4-2\epsilon\}}(0,0,p^2;0,0,0)$

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For ϵ, ε see the file on notation. Triangle with two massless external lines

$$
\begin{aligned}
I_3^{\{D=4-2\epsilon\}}(0,0,p^2;0,0,0) &= \frac{\mu^{2\epsilon}}{\epsilon^2}\left(\frac{(-p^2-i\varepsilon)^{-\epsilon}}{p^2}\right) \\
&= \frac{1}{p^2}\left(\frac{1}{\epsilon^2}+\frac{1}{\epsilon}\ln\left(\frac{\mu^2}{-p^2-i\varepsilon}\right)+\frac{1}{2}\ln^2\left(\frac{\mu^2}{-p^2-i\varepsilon}\right)\right)+\mathcal{O}(\epsilon).
\end{aligned}
$$

For $\epsilon, \varepsilon, \ln, \mathrm{Li}_2$ see the file on notation.

We also present this function with the singularities regulated with a small mass λ, (from ref. [1],Eq.(A.3))

$$
I_3^{\{D=4\}}(0,0,p^2;\lambda^2,\lambda^2,\lambda^2) = \frac{1}{2p^2}\ln^2\left(\frac{-p^2-i\varepsilon}{\lambda^2}\right)+\mathcal{O}(\lambda^2)
$$

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References

[1] W. Beenakker, S. Dittmaier, M. Kramer, B. Plumper, M. Spira and P. M. Zerwas, Nucl. Phys. B **653**, 151 (2003) [arXiv:hep-ph/0211352]. [arXiv:hep-ph/0211352]