1 Feynman Parameters

$$\frac{1}{A_1^{m_1}...A_n^{m_n}} = \int_0^\infty dx_1...dx_n\,\delta(x_1+...x_n-1)\frac{x_1^{m_1-1}...x_n^{m_n-1}}{(x_1A_1+...+x_nA_n)^{m_1+...+m_n}}\frac{\Gamma(m_1+...+m_n)}{\Gamma(m_1)...\Gamma(m_n)}$$

$$\frac{1}{A^n}-\frac{1}{B^n} = \int_0^\infty dxdy\,\delta(x+y-1)\frac{n(B-A)}{(xA+yB)^{n+1}}$$

2 Dim. Reg.

$$\int\frac{d^{2\omega}k}{(2\pi)^{2\omega}}\frac{1}{(k^2-\Delta)^r} = i\,(-1)^r\frac{\Gamma(r-\omega)}{(4\pi)^\omega\,\Gamma(r)}\,\Delta^{\omega-r}$$

$$\int\frac{d^{2\omega}k}{(2\pi)^{2\omega}}\frac{k^\mu k^\nu}{(k^2-\Delta)^r} = i\,(-1)^{1+r}\frac{\Gamma(r-\omega-1)}{2\,(4\pi)^\omega\,\Gamma(r)}\,\Delta^{\omega+1-r}\,g^{\mu\nu}$$

3 Shifting

$$\int\frac{d^4p}{(2\pi)^4}\frac{p^\mu}{((p+q)^2-m^2)^2} = \int\frac{d^4p}{(2\pi)^4}\frac{(p-q)^\mu}{(p^2-m^2)^2}+\frac{i\,q^\mu}{32\pi^2}$$

$$\int\frac{d^4p}{(2\pi)^4}\frac{p^\mu p^\nu p^\tau}{((p+q)^2-m^2)^3} = \int\frac{d^4p}{(2\pi)^4}\frac{(p-q)^\mu(p-q)^\nu(p-q)^\tau}{(p^2-m^2)^3} +\frac{i}{192\pi^2}\left(g^{\mu\nu}q^\tau+g^{\nu\tau}q^\mu+g^{\mu\tau}q^\nu\right)$$

$$\int\frac{d^4p}{(2\pi)^4}\frac{p^\mu p^\nu}{((p+q)^2-m^2)^2} = \int\frac{d^4p}{(2\pi)^4}\frac{(p-q)^\mu(p-q)^\nu}{(p^2-m^2)^2} -\frac{i\,q^\mu q^\nu}{32\pi^2}-\frac{i}{96\pi^2}\left(g^{\mu\nu}q^2+2q^\mu q^\nu\right)$$

4 Miscellaneous

$$\frac{1}{4\pi}\int d\Omega_k \mathcal{J}(\mathbf{v},\mathbf{v}') \quad = \quad \int_0^1 dx\, \frac{q^2\,(2x(1-x)-1)}{m^2-q^2x(1-x)}$$

where

$$\mathcal{J}(\mathbf{v},\mathbf{v}') \quad \equiv \quad \frac{2p.p'}{(E-\mathbf{p}.\hat{\mathbf{k}})(E'-\mathbf{p}'.\hat{\mathbf{k}})} - \frac{m^2}{(E-\mathbf{p}.\hat{\mathbf{k}})(E-\mathbf{p}.\hat{\mathbf{k}})} - \frac{m^2}{(E'-\mathbf{p}'.\hat{\mathbf{k}})(E'-\mathbf{p}'.\hat{\mathbf{k}})}$$

and $p' = p + q$, $p = E(1, \mathbf{v})$, $p' = E'(1, \mathbf{v}')$