DMFT CP-Project

January 22, 2016

1 Fouriertransform

Hello Guys, Tobias said we should first try to do the Inverse Fouriertransform of

$$G(i\omega) = \frac{1}{i\omega_n + a} \tag{1}$$

But what is the solution ($\beta = 1$) to

$$G(\tau) = \sum_{\omega_n} \frac{1}{i\omega_n + a} e^{-i\omega_n \tau} \tag{2}$$

Mathematica says this sum does not converge.

From the inverse transform, it follows that:

$$\frac{-1}{2} \int_0^\beta d\tau e^{i\omega_n \tau} = \frac{-1}{2i\omega_n}(e^{i\omega_n \beta} - 1) = \frac{1}{i\omega_n} \tag{3}$$

Furthermore:

$$\sum_{\omega_n} \frac{1}{i\omega_n + a} e^{-i\omega_n \tau} = -n_{FD}(-a)e^{a\tau} \tag{4}$$

$$\Sigma(i\omega) = -U^2 \sum_{\nu,q} G_0(i\nu)G_0(i\omega - i\nu + iq)G_0(iq) = -U^2 \int d\tau G_0(\tau)^3 e^{i\omega\tau} \tag{5}$$