

HOMEWORK 4A: Harmonic Oscillator Green's Function

COURSE: Physics 231, *Methods of Theoretical Physics* (2019)

INSTRUCTOR: Professor Flip Tanedo (flip.tanedo@ucr.edu)

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1 The 1D Harmonic Oscillator

The harmonic oscillator with driving force (per unit mass) is given by $F(t)$.

$$\ddot{x}(t) + \omega_0^2 x(t) = F(t) . \quad (1.1)$$

Find the Green's function for the harmonic oscillator.

Start by writing out the Green's function equation. Then do a Fourier transform to determine $\tilde{G}(k)$, then perform the integral to obtain $G(t)$. Pick a $\pm i\epsilon$ prescription to push the poles off the real axis. The choice of prescription determined whether we were calculating the advanced, retarded, or Feynman Green's function. Pick the one that is physical.