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Graph 2 Section: 2

Matlab
Question (2)
Part (1)

$m(t) = 3\,sinc^2(10^{-3}t)$ $\qquad r(t) = m(t)\cos(2\pi 10^5 t)$

$m(t) \Rightarrow M(\omega) = \int_{-\infty}^{\infty} m(t)\, e^{-j\omega t}\, dt$

From table

$\frac{W}{2\pi} sinc^2\left(\frac{Wt}{2}\right) \Rightarrow \Delta\left(\frac{\omega}{2W}\right)$

$\therefore \frac{W}{2} = 10^{-3}$

$W = 2\times10^{-3}$

$M(\omega) = \frac{2\pi}{2\times10^{-3}} \cdot \Delta\frac{\omega}{4\times10^{-3}}$

$\frac{2\times10^{-3}}{2\pi} M(\omega) = \Delta\left(\frac{\omega}{2W}\right)$

$R(\omega) = M(\omega)\, F(\cos 2\pi 10^5 t)$

$m(t)\cos(\omega_0 t) = \frac{1}{2}[M(\omega-\omega_0)+M(\omega+\omega_0)]$ Property of Fourier transform in Case of Frequency Shift

$R_\omega = 500\pi\left[\Delta\left(250(\omega - 2\pi\times10^5)\right) + \Delta\left(250(\omega + 2\times\pi\times10^5)\right)\right]$

$R(\omega)$ is the result of the frequency shift by $M(\omega)$