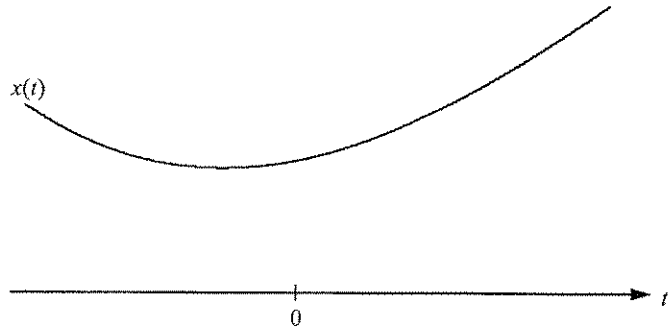
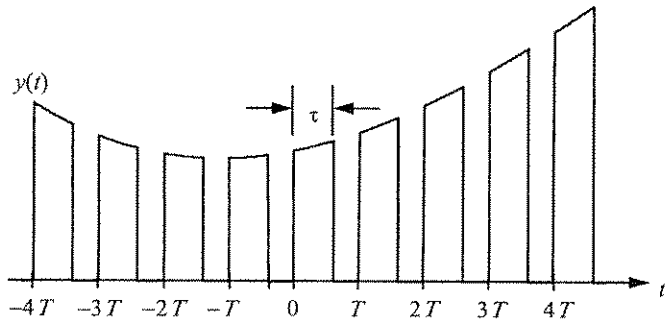
Stanford University, Department of Electrical Engineering
Qualifying Examination, Winter 2007-08
Professor Joseph M. Kahn

A continuous-time signal $x(t)$, $-\infty < t < \infty$, has a Fourier transform $X(j\omega)$.



We are only able to observe $x(t)$ for intervals of duration τ, which occur periodically with period T. So we observe the signal $y(t)$, $-\infty < t < \infty$, as shown. Find an expression for its Fourier transform $Y(j\omega)$.



Now we concatenate all of these observations as shown to form a new signal $z(t)$, $-\infty < t < \infty$. Find an expression for its Fourier transform $Z(j\omega)$.