⑧ The multiplication property

$$x(t) \longleftrightarrow X(jw)$$

$$y(t) \longleftrightarrow Y(jw)$$

Convolution

$$x(t) * y(t) \longleftrightarrow X(jw) \cdot Y(jw)$$

Multiplication

$$z(t) = x(t) \cdot y(t) \longleftrightarrow$$

Example:

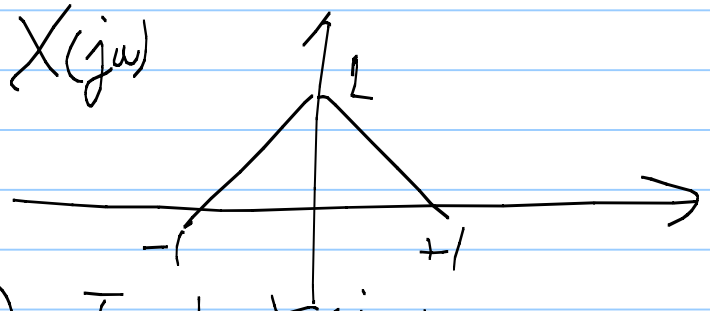
$y(t) = x(t) \cdot e^{jw_0 t}$ Find $Y(jw)$ in terms of $X(jw)$

Ans:

Convolution of a shifted delta
≡ direct shift of the original signal.

Example:

$$y(t) = x(t) \cdot \cos(W_0 t)$$

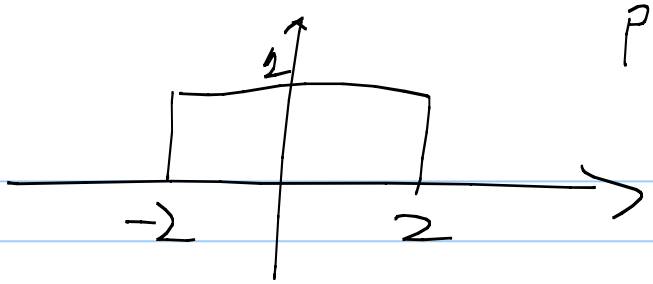


Q: Find $Y(jw)$.

Ans:

Another example

$Y(j\omega) =$



Knowing $y(t) = x(t)\cos(t)$

Find $X(j\omega)$ & $x(t)$

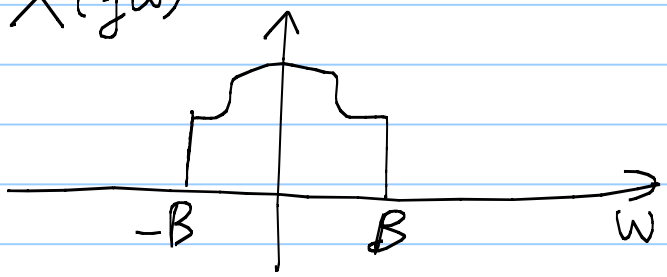
Ans

---

* An example of joint application of the multiplication/freq-shift & the convolution properties.

Suppose our original signal has a spectrum

$X(j\omega)$



Say $B = 20\,kHz$. Music signals.

$x(t)$