

g(u) = du.

$$\frac{d H(e^{j\omega})}{d\omega} = \frac{d(|H(e^{j\omega})| \cdot e^{j\theta(\omega)})}{d\omega} = \frac{d|H(e^{j\omega})|}{d\omega} \cdot e^{j\theta(\omega)} + |H(e^{j\omega})| \cdot e^{j\theta(\omega)} \cdot j \left(\frac{d\theta(\omega)}{d\omega} \right)$$

$$\frac{d\theta(\omega)}{d\omega} = \frac{\frac{d|H(e^{j\omega})|}{d\omega} \cdot e^{j\theta(\omega)} - \frac{dH(e^{j\omega})}{d\omega}}{|H(e^{j\omega})| (e^{j\theta(\omega)})}$$

$$= \frac{\frac{d|H(e^{j\omega})|}{d\omega}}{|H(e^{j\omega})| \cdot j} - \frac{\frac{dH(e^{j\omega})}{d\omega}}{H(e^{j\omega}) \cdot j}$$

$\downarrow \downarrow \text{Re}$

$$\Re \left\{ j \frac{\frac{d|H(e^{j\omega})|}{d\omega}}{|H(e^{j\omega})|} \right\}$$