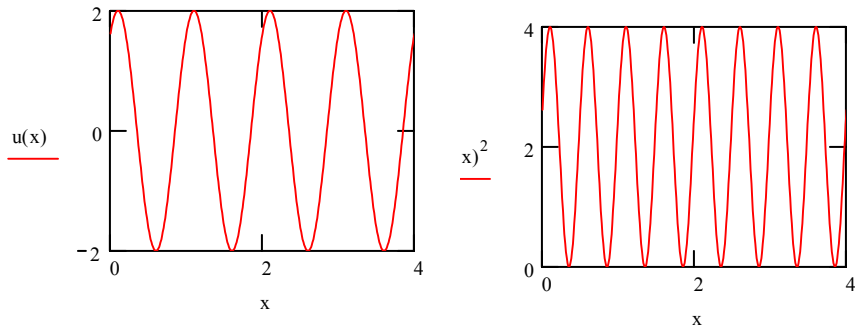
I4COSINTS

Intensity in real and complex notation

Real notation for maxima

$$x := 0, .01 .. 4 \qquad \lambda := 1 \qquad A := 1 \qquad t := 1 \quad T := 10 \qquad \delta := 0$$

$$u(x) := \left[A \cdot \cos\left[2 \cdot \pi \cdot \left(\frac{x}{\lambda} - \frac{t}{T} \right) \right] + A \cdot \cos\left[2 \cdot \pi \cdot \left(\frac{x - \delta}{\lambda} - \frac{t}{T} \right) \right] \right]$$



The time average of the intensity is1/2 of the maximum value 4

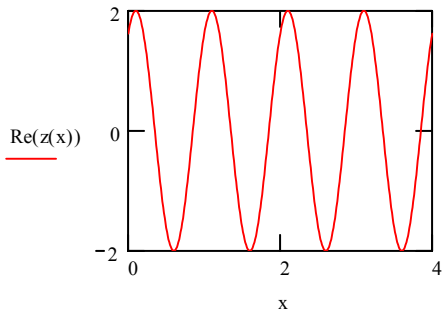
$$t := 1$$

Complex notation

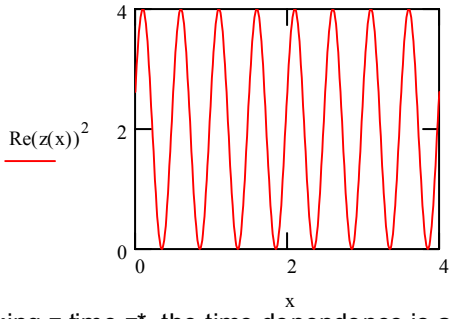
$$i := \sqrt{-1}$$

$$z(x) := \left[\left[\exp\left[i \cdot 2 \cdot \pi \cdot \left(\frac{x}{\lambda} - \frac{t}{T} \right) \right] \right] + A \cdot \exp\left[i \cdot 2 \cdot \pi \cdot \left(\frac{x - \delta}{\lambda} - \frac{t}{T} \right) \right] \right]$$

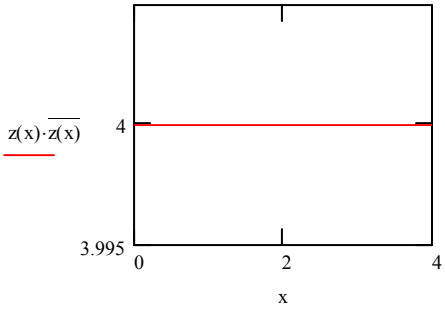
The real part of z(x) is Re(z(x))



The real part squared is [Re(z(x)]2



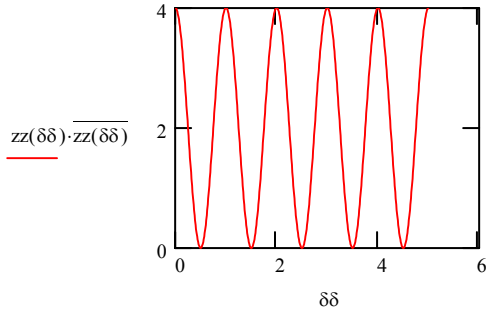
When taking z time z*, the time dependence is automatically eliminated and we get twice of the average value.



Complex notation and dependance on the optical path differnce $\delta\delta$

$$\delta\delta := 0, .01 .. 5 \qquad x := 1$$

$$zz(\delta\delta) := \left[\left[\exp\left[i\cdot 2\cdot\pi\cdot\left(\frac{x}{\lambda} - \frac{t}{T}\right)\right]\right] + A\cdot\exp\left[i\cdot 2\cdot\pi\cdot\left(\frac{x-\delta\delta}{\lambda} - \frac{t}{T}\right)\right]\right]$$



We see the "fringe pattern"