1)

$$u(t) \xrightarrow{\quad} \bigotimes \xrightarrow{a(t)} \boxed{g(t)} \xrightarrow{b(t)} \xrightarrow{c(\tau)} \boxed{h(t)} \xrightarrow{\quad} v(f)$$
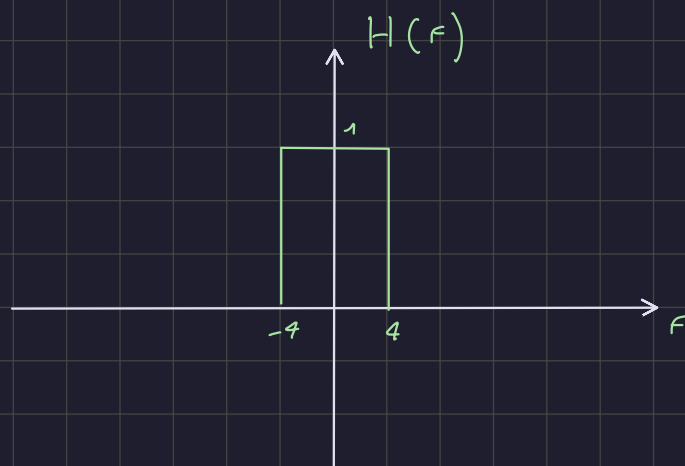
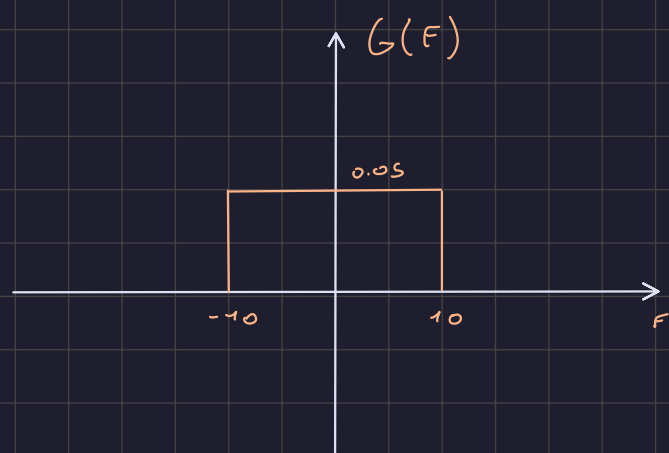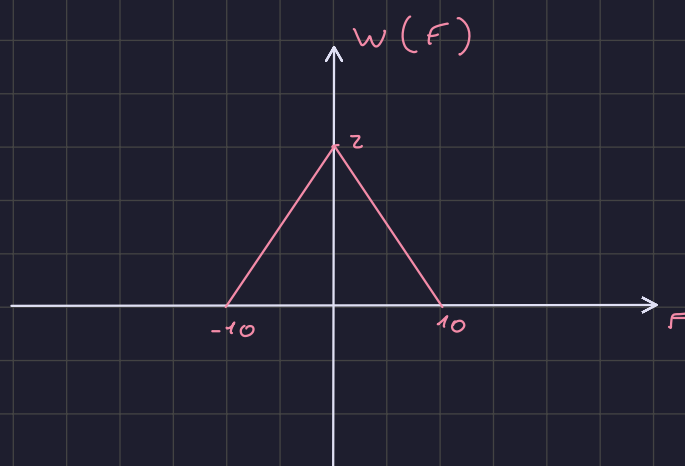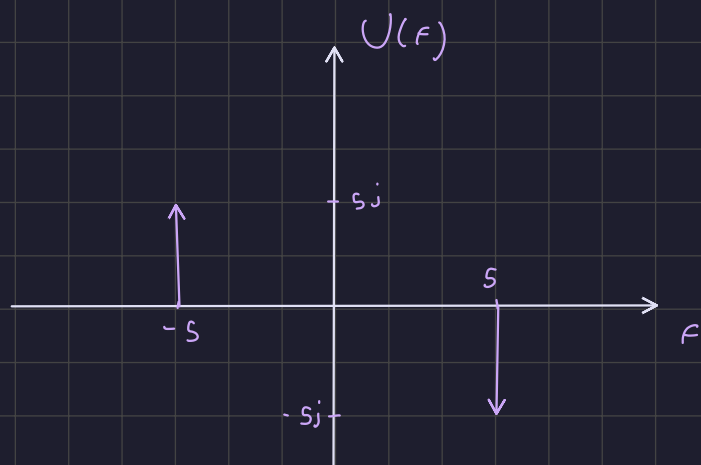with $w(t)$ into the multiplier and T_c at the switch.

$$u(t) = 10 \sin(10\pi t) = \overset{A}{10} \sin\left(2\pi \overset{F_0}{5} t\right) \xrightarrow{F} U(f) = 5\delta(f-5) - 5j\delta(f+5)$$
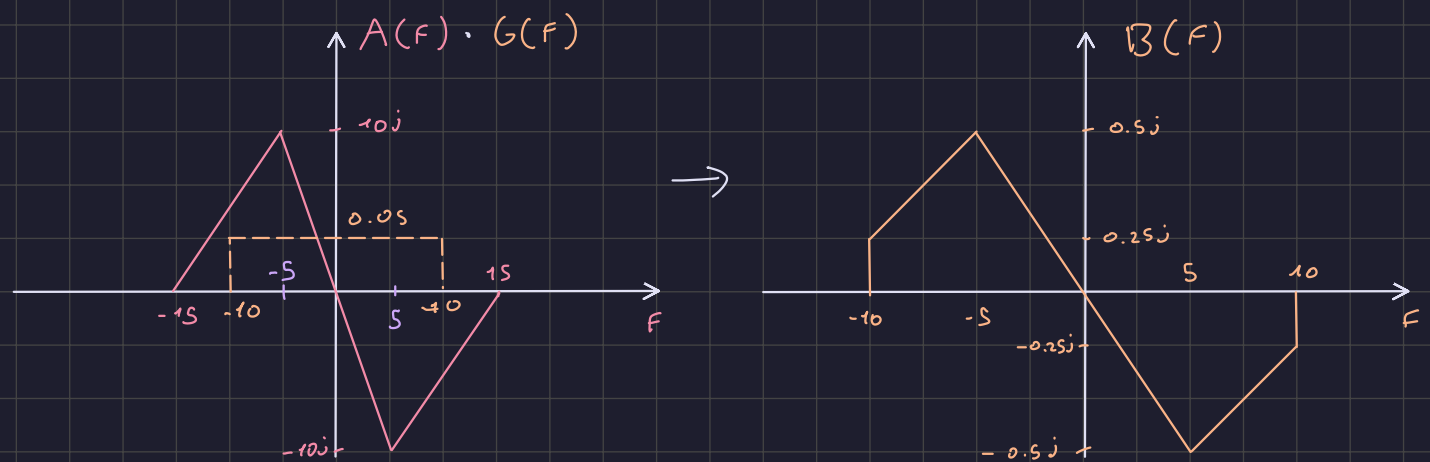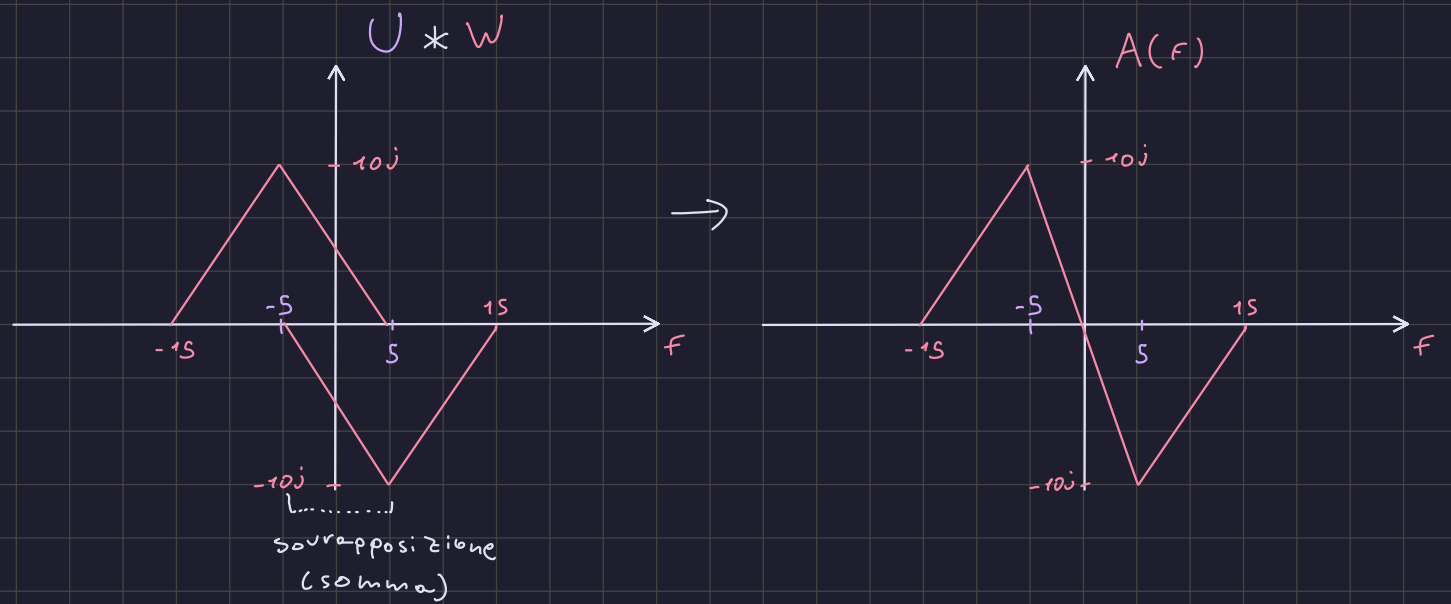
$$w(t) = 20 \operatorname{sinc}^2(10t) = 2 \cdot 10 \operatorname{sinc}^2(10t) \xrightarrow{F} W(f) = 2 \triangle\left(\frac{f}{10}\right)$$

$$g(t) = \operatorname{sinc}(20t) = 0.05 \cdot 20 \operatorname{sinc}(20t) \xrightarrow{F} G(f) = 0.05 \,\Pi\left(\frac{f}{20}\right)$$

$$h(t) = 8\operatorname{sinc}(8t) = 1 \cdot 8 \operatorname{sinc}(8t) \xrightarrow{F} H(f) = 1 \cdot \Pi\left(\frac{f}{8}\right)$$
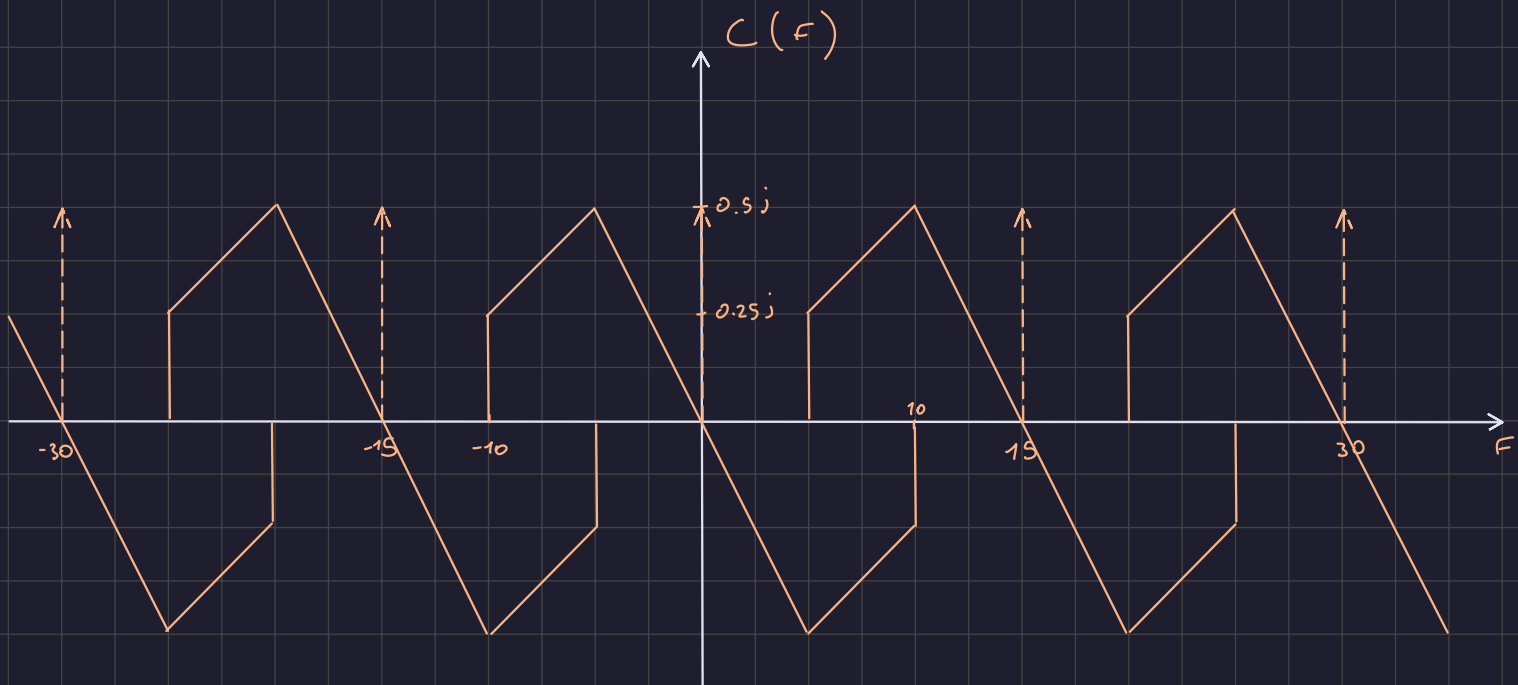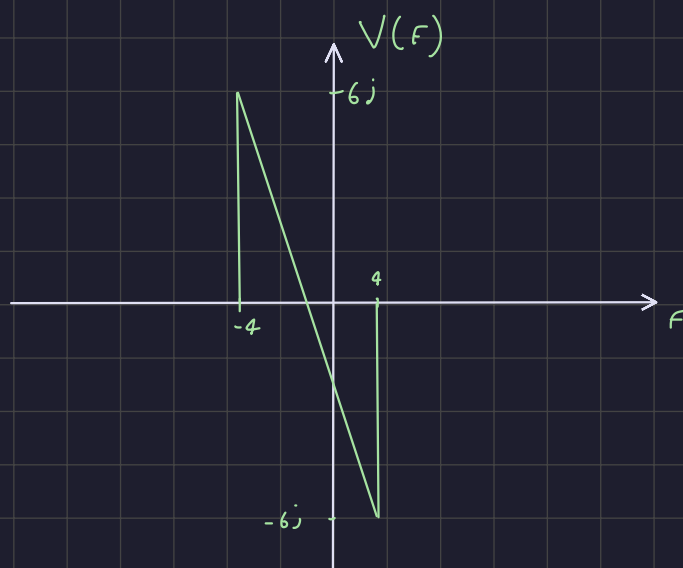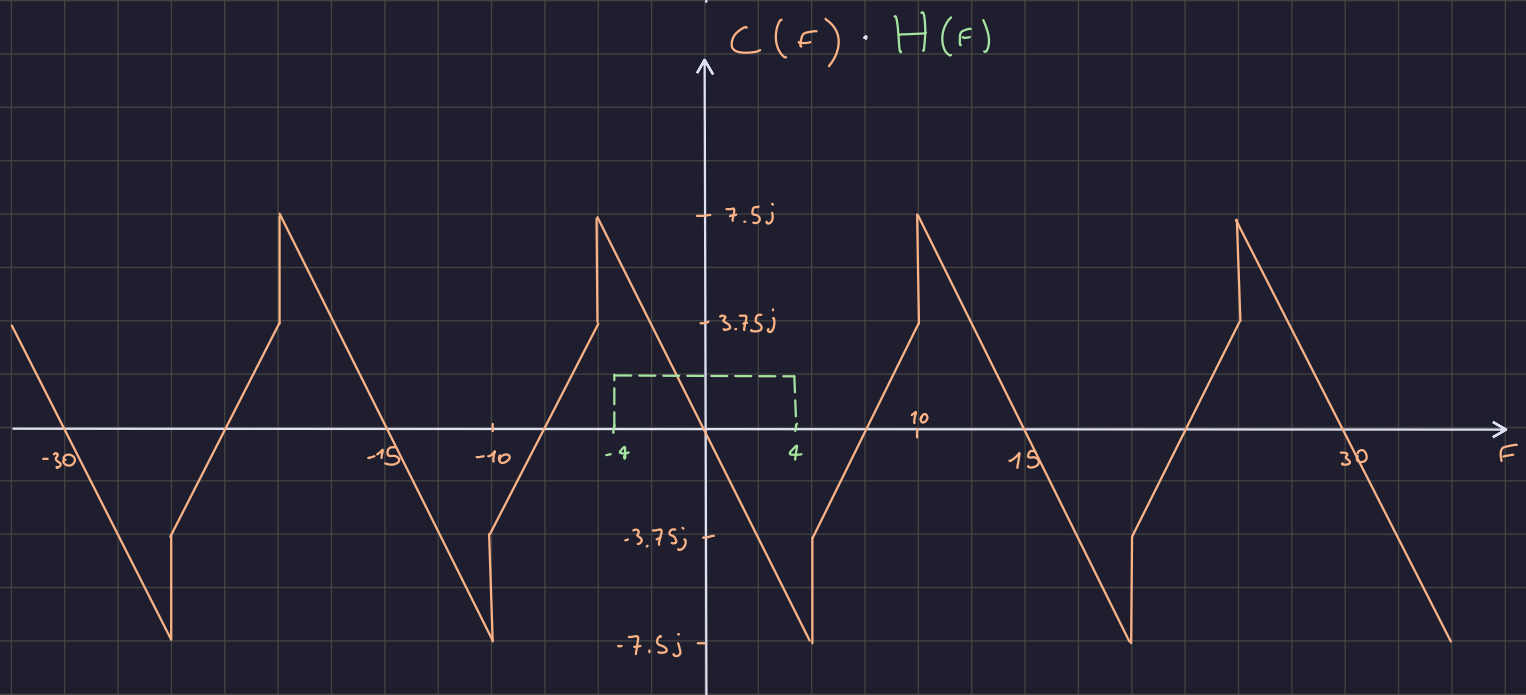
$$T_c = 66,7 \, ms$$

$U * W$
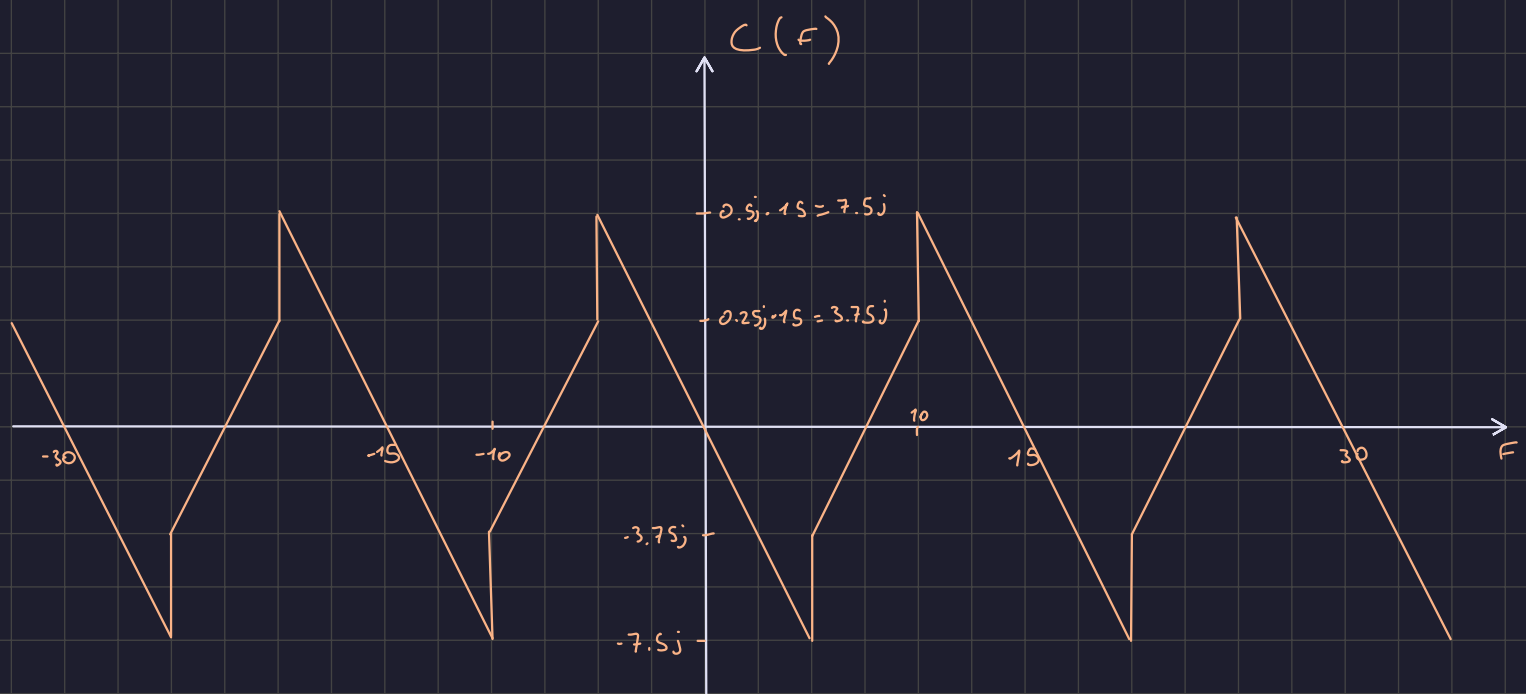

$A(F)$

sovrapposizione
(somma)

$A(F) \cdot G(F)$

$B(F)$

Campionamento

$T_c = 66,7 \, ms \rightarrow F_c = \frac{1}{T_c} = 15 \, H_z$

$F_c > 2B?$

$15 > 20 \rightarrow$ Aliasing

$C(F)$

$C(F)$

$-0.5j \cdot 15 = 7.5j$

$-0.25j \cdot 15 = 3.75j$

$-3.75j$

$-7.5j$

-30 -15 -10 10 15 30 F

$C(F) \cdot H(F)$

$7.5j$

$3.75j$

$-3.75j$

$-7.5j$

-30 -15 -10 -4 4 10 15 30 F

$V(F)$

$6j$

-4 4 F

$-6j$

$$V(F) = \left[6 \, \triangle \left(\frac{F}{4} \right) * \left(\frac{1}{2} j \, \delta(F-4) - \frac{1}{2} j \, \delta(F+4) \right) \right] \cdot \sqcap \left(\frac{F}{8} \right)$$

$$\downarrow F^{-1}$$

$$v(t) = \left(24 \, \text{sinc}^2(4t) \cdot \sin(8\pi t) \right) * 8 \, \text{sinc}(8t)$$