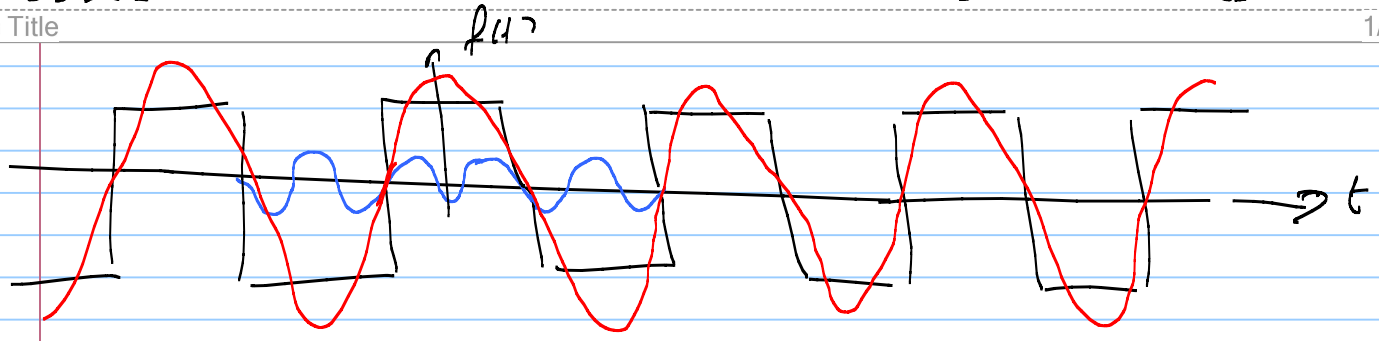
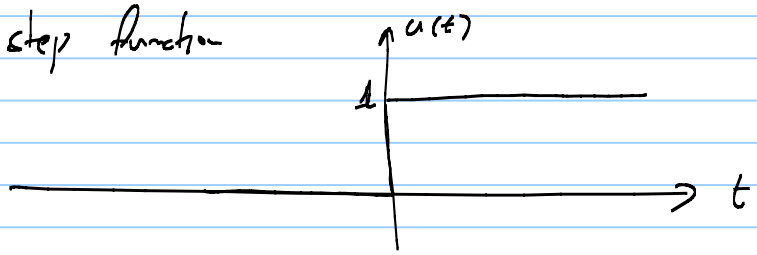
EE362 Lecture 2 Notes

Note Title 1/24/2019

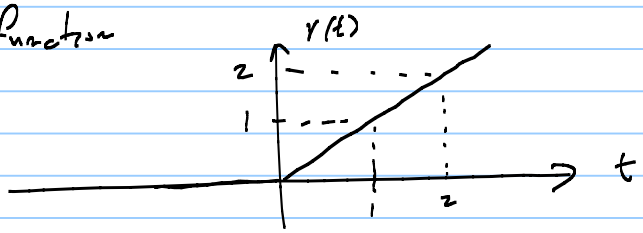



(1) Unit-step function

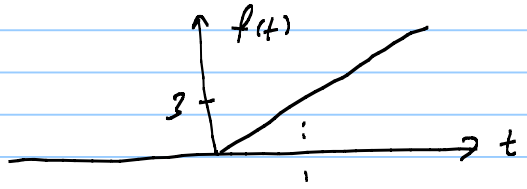



$$u(t) = \begin{cases} 0, & t<0 \\ 1, & t \geq 0 \end{cases}$$

(2) Unit-ramp function



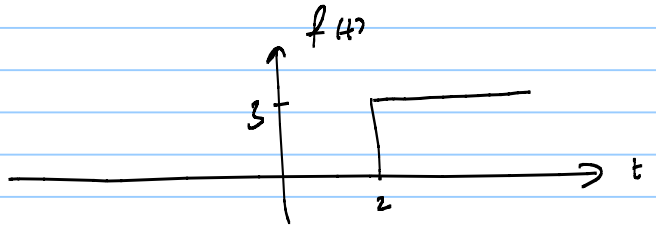

$$r(t) = \begin{cases} 0, & t<0 \\ t, & t \geq 0 \end{cases}$$




$$f(t) = \begin{cases} 0, & t<0 \\ 3t, & t \geq 0 \end{cases}$$

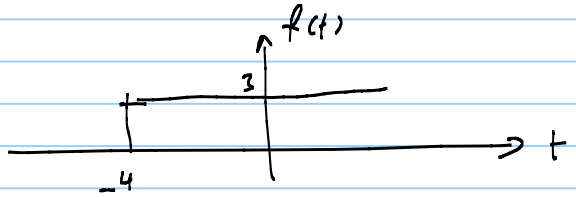
$$= 3r(t)$$

(3)



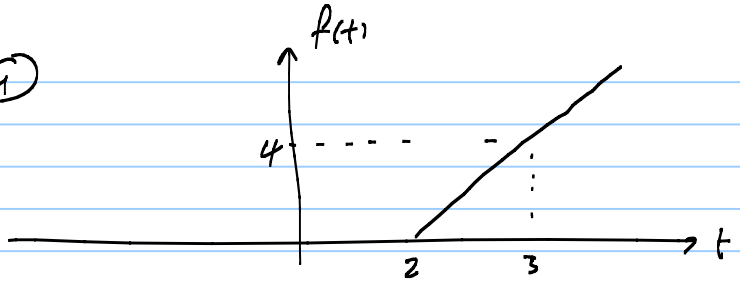

$$f(t) = \begin{cases} 0, & t<2 \\ 3, & t \geq 2 \end{cases}$$

$$= 3u(t-2)$$



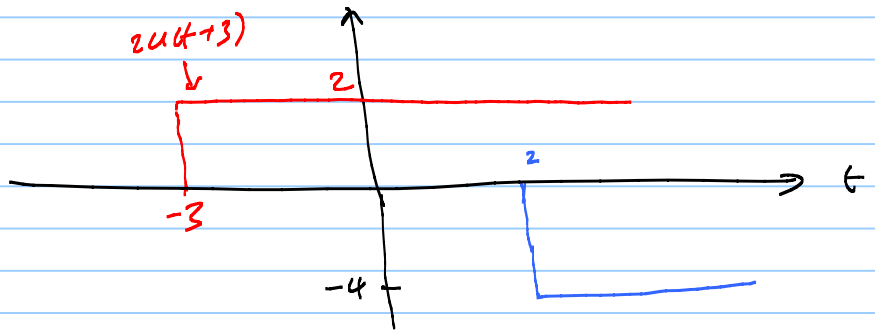

$$f(t) = 3u(t+4)$$

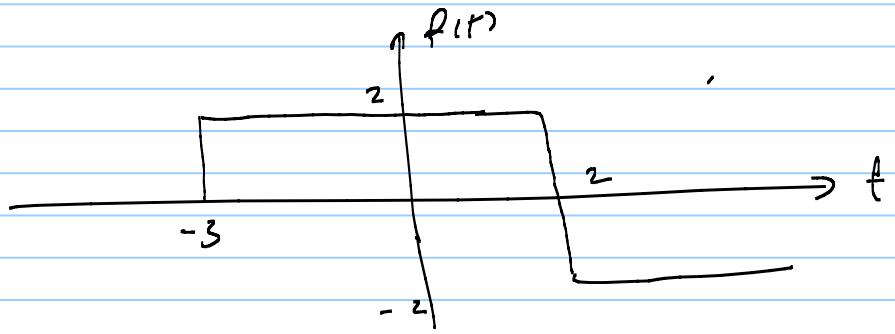
④



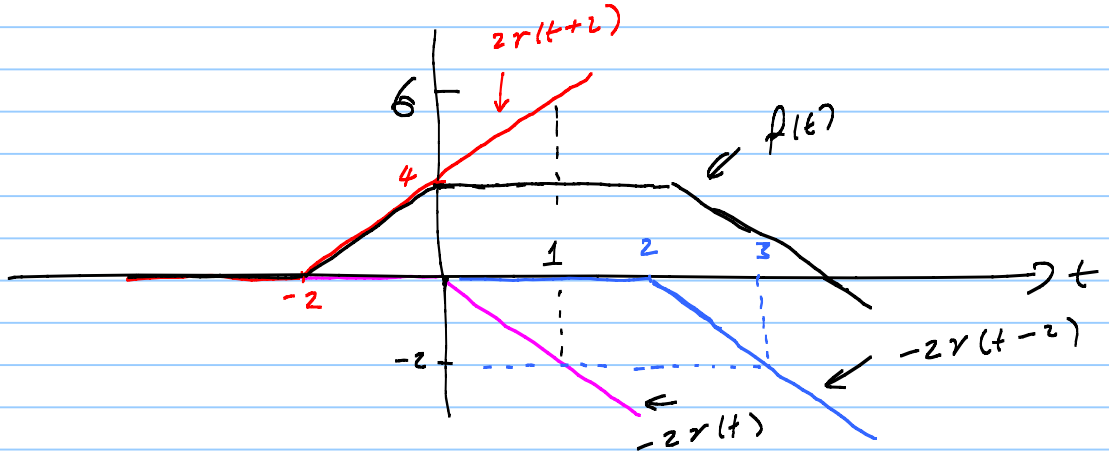

$f(t) = 4\,r(t-2)$

⑤ $f(t) = 2u(t+3) - 4u(t-2)$

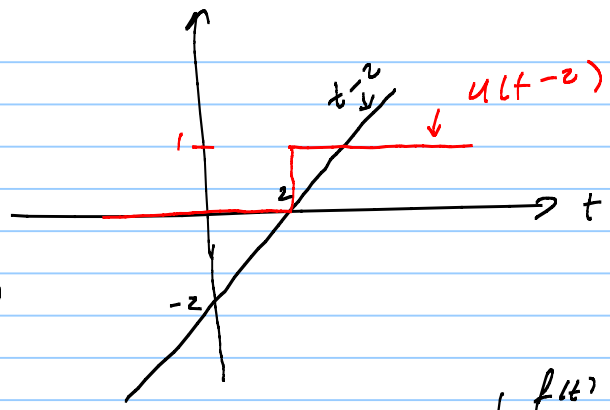


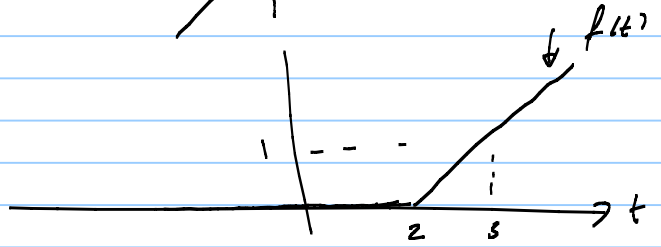

⑥ $f(t) = 2r(t+2) - 2r(t) - 2r(t-2)$



(7) $f(t) = (t-2)u(t-2)$




$(t-2)u(t-2) = r(t-2)$

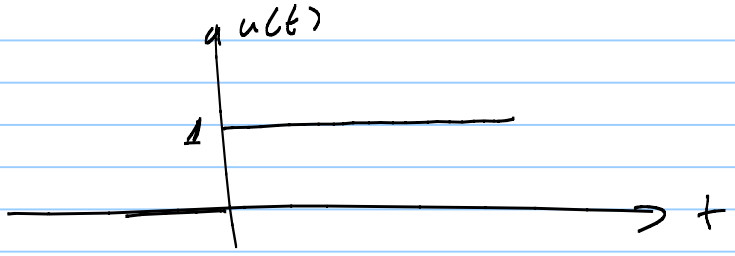



(8) $f(t) = 2(t+3)u(t+3) = 2r(t+3)$

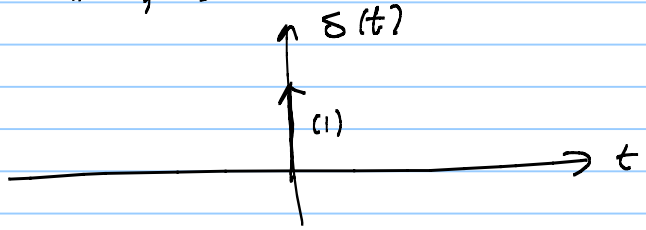
(9) $\frac{dr(t)}{dt} = \begin{cases} 0, & t<0 \\ 1, & t\geq 0 \end{cases}$ $\qquad r(t) = \begin{cases} 0, & t<0 \\ t, & t\geq 0 \end{cases}$

$= u(t)$

$\int_{-\infty}^{t} u(t)\,dt = r(t)$

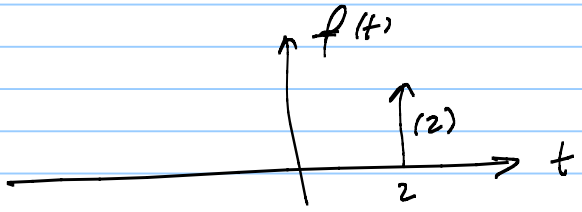



(10) Unit - Impulse function

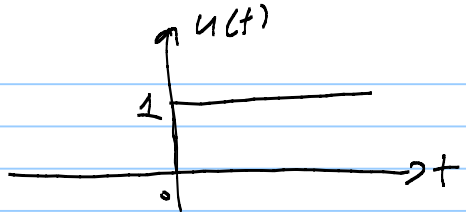


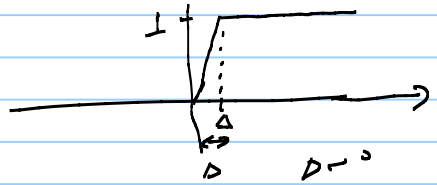

$\delta(t) = \begin{cases} 1, & t=0 \\ 0, & \text{otherwise} \end{cases}$

$f(t) = 2\delta(t-2)$

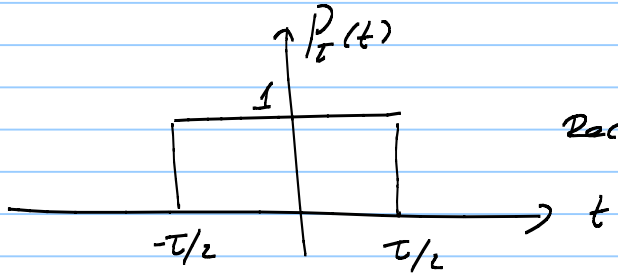


(11) $\frac{du(t)}{dt} = \delta(t)$



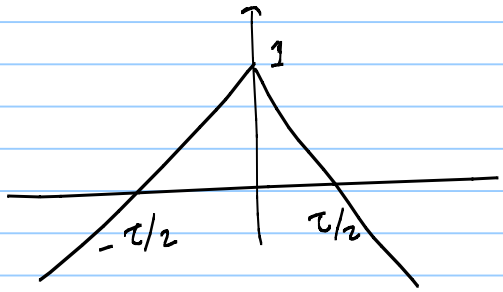




(12)

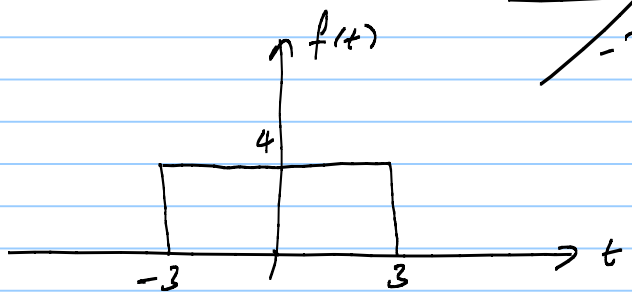



Rectangular function

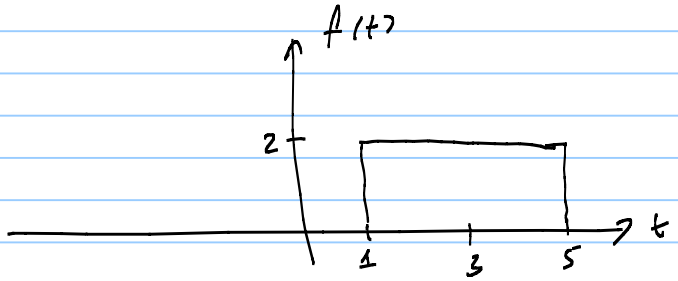
$u(t+\tau/2) - u(t-\tau/2)$



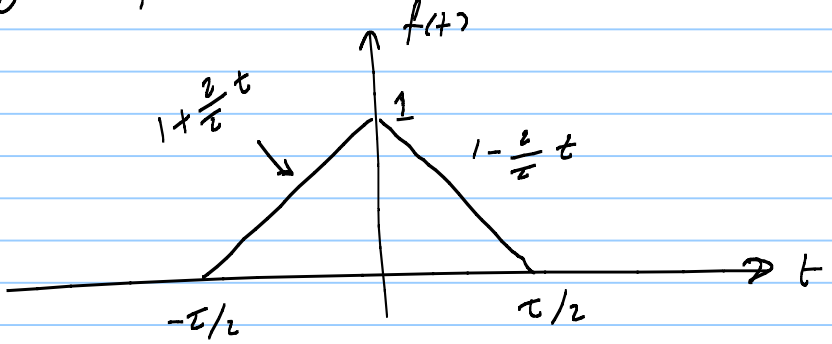

$f(t) = 4\,P_6(t)$




$f(t) = 2\,P_4(t-3)$



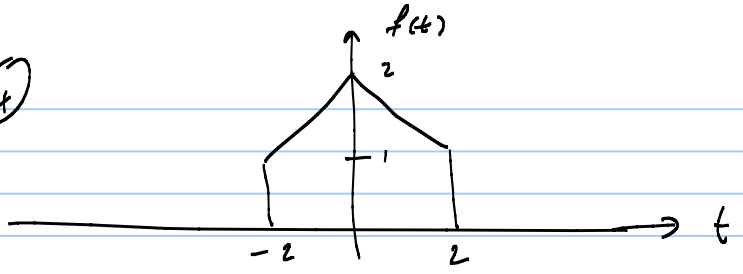

(13) Triangular pulse function




$$\begin{cases} 1+\frac{2t}{\tau}, & -\frac{\tau}{2} \le t \le 0 \\ 1-\frac{2t}{\tau}, & 0 \le t \le \frac{\tau}{2} \\ 0, & \text{otherwise} \end{cases}$$

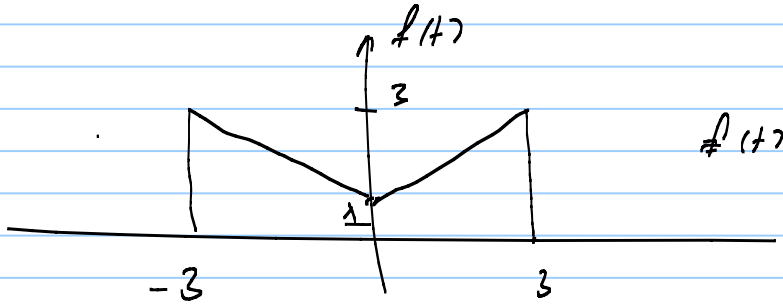
$$f(t) = \left(1 - \frac{2|t|}{\tau}\right) P_\tau(t)$$

(14)




$$f(t) = P_4(t) + \left(1 - \frac{2|t|}{4}\right) P_4(t)$$

(15)




$$f(t) = 3\,P_6(t) - 2\left(1 - \frac{2|t|}{6}\right) P_6(t)$$