Sharen Rajenthiran

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

$$r(-t) = \begin{cases} -t, & -t \ge 0 \\ 0, & -t < 0 \end{cases} = \begin{cases} -t, & t \le 0 \\ 0, & t > 0 \end{cases}$$

$$r(t-2) = \begin{cases} t-2, & t \ge 2\\ 0, & t < 2 \end{cases}$$

$$r(2-t) = \begin{cases} 2-t, & t \le 2 \\ 0, & t > 2 \end{cases}$$

$$r_{even}(t) = \frac{1}{2}(r(t) + r(-t)) = \frac{1}{2} \left(\begin{cases} t, & t \ge 0 \\ 0, & t < 0 \end{cases} + \begin{cases} -t, & t \le 0 \\ 0, & t > 0 \end{cases} \right) = \frac{1}{2} \left\{ \begin{matrix} t, & t \ge 0 \\ -t, & t < 0 \end{cases}$$

$$r_{even}(t) = \frac{1}{2} \begin{cases} t, & t \ge 0 \\ -t, & t < 0 \end{cases}$$

$$r_{odd}(t) = \frac{1}{2}(r(t) - r(-t)) = \frac{1}{2} \left(\begin{cases} t, & t \geq 0 \\ 0, & t < 0 \end{cases} - \begin{cases} -t, & t \leq 0 \\ 0, & t > 0 \end{cases} \right) = \frac{1}{2} \begin{cases} t, & t \geq 0 \\ t, & t < 0 \end{cases}$$

$$r_{odd}(t) = \frac{1}{2} \begin{cases} t, & t \ge 0 \\ t, & t < 0 \end{cases}$$

$$r_{odd} + r_{even} = \frac{1}{2} \left\{ \begin{matrix} t, & t \geq 0 \\ t, & t < 0 \end{matrix} + \frac{1}{2} \left\{ \begin{matrix} t, & t \geq 0 \\ -t, & t < 0 \end{matrix} \right. = \frac{1}{2} \left\{ \begin{matrix} 2t, & t \geq 0 \\ 0, & t < 0 \end{matrix} \right. = \left\{ \begin{matrix} t, & t \geq 0 \\ 0, & t < 0 \end{matrix} \right. = r(t)$$