$t\cos(2t) + 4$

Switched on from $t = 7$ to $t = 13$

$(t-7)\cos(2(t-7)) + 4$

$[u(t-7) - u(t-13)]$

$g(t)u(t-a) \longrightarrow e^{-as}\mathcal{L}\{g(t+a)\}$

$(t-7)\cos(2(t-7)) + 4]\, u(t-7)$

$\underbrace{(t-7)\cos(2(t-7)) + 4]}_{g(t)}$

$$e^{-7s}\mathcal{L}(g(t+7))$$

$$g(t+7) = (t-\cancel{7}+\cancel{7})\cos(2(t-\cancel{7}+\cancel{7}))4$$

$$t\cos 2t \xrightarrow{\mathcal{L}} -\frac{d}{ds}\mathcal{L}\{\cos 2t\}$$

$$= -\frac{d}{ds}\frac{s}{s^2+4}$$

$$= -\frac{(1)(s^2+4) - s(2s)}{(s^2+4)^2}$$

$$= -\frac{-s^2+4}{(s^2+4)^2}$$

Don't forget the Four!

$$4 \, d \rightarrow \frac{4}{s}$$

$$\left(\frac{s^2-4}{(s^2+4)^2} + \frac{4}{s}\right)e^{-7s}$$

Now for the Clese

$$\underbrace{(t-7)\cos(2(t-7))+4]}_{g(t)} \, u(t-13)$$

$$g(t+13) = (t+6)\cos(2t+12)+4$$

$$= (t+6)\underbrace{\cos 2t \cos 12 - \sin 2t \sin 12}\; + 4$$

Multiply that out. you'll have a constant term, and a t term.

<u>Inversion problem</u>

$$e^{-7s}\frac{s+1}{s^2(s+2)^2}$$

$$\frac{s+1}{s^2(s+2)^2} = \frac{A}{s} + \frac{B}{s^2} + \frac{C}{(s+2)} + \frac{D}{(s+2)^2}$$

$$B = \frac{0+1}{(0+2)^2} = \frac{1}{4}$$

$$D = \frac{-2+1}{(-2)^2} = -\frac{1}{4}$$

.....

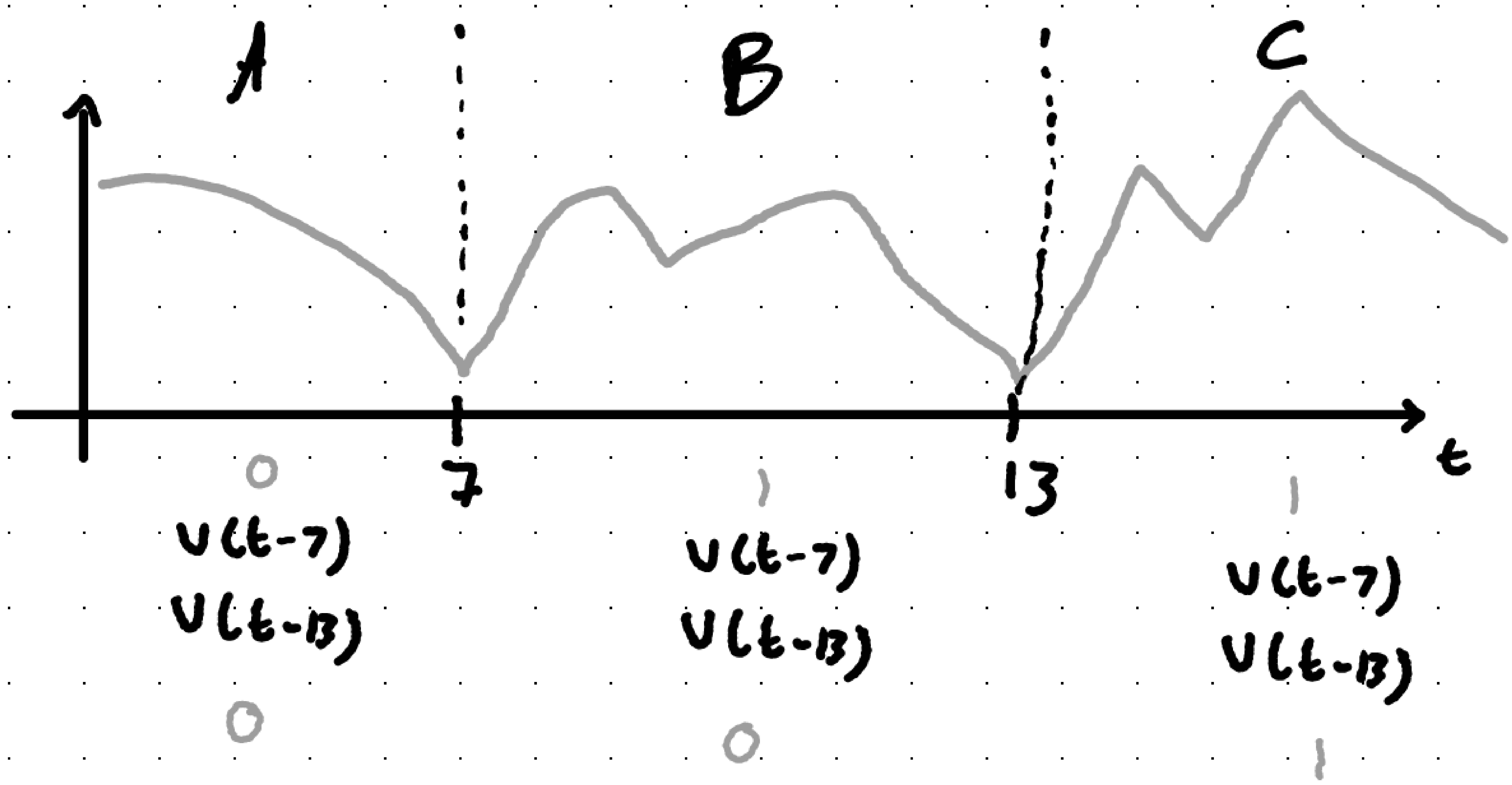
And so on.

Now, we need to do the other transform.

$$e^{-as}F(s) \rightarrow U(t-a)\,f(t)$$

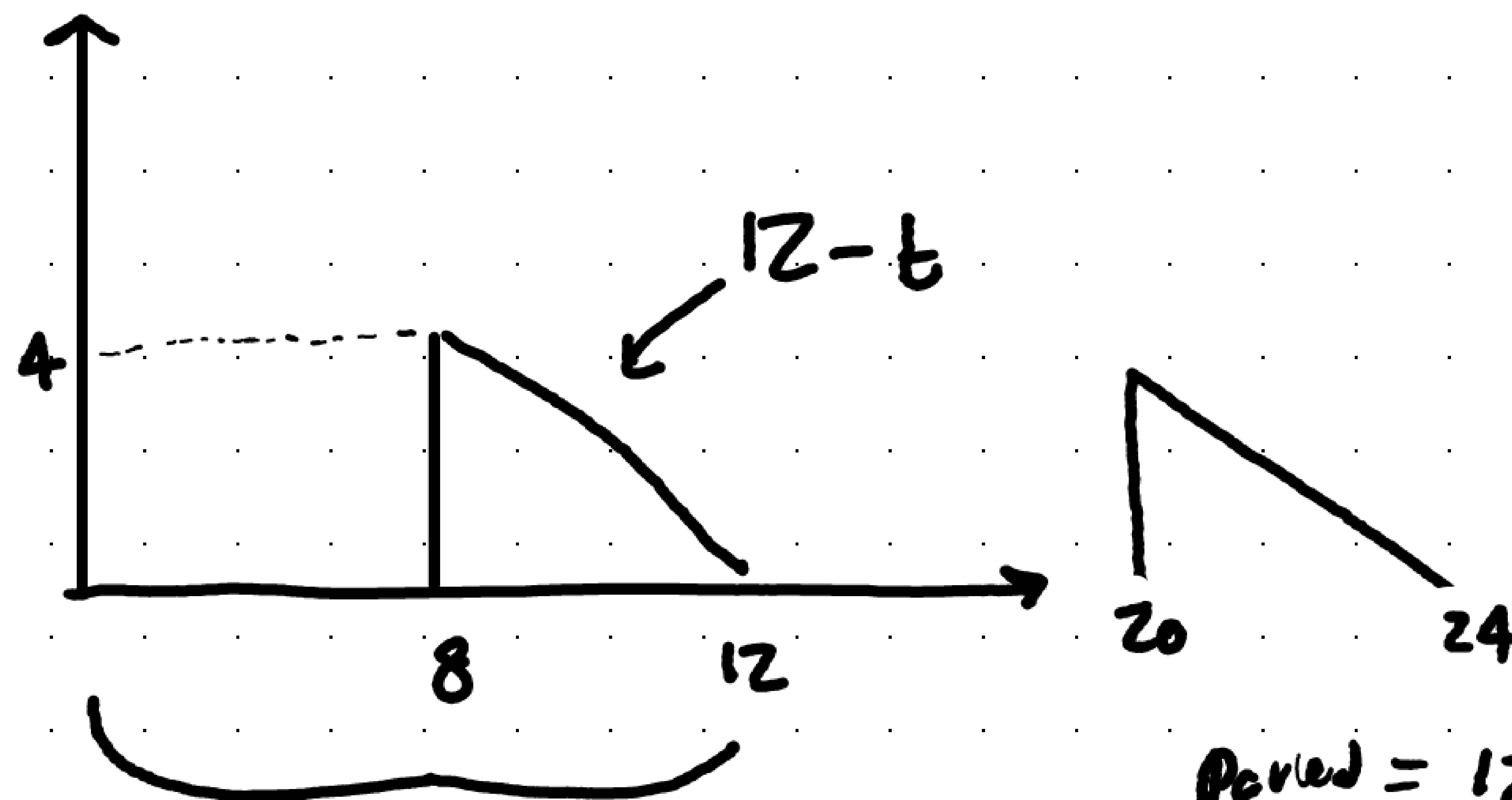
Sketching

$$u(t-7)\, f_1(t-7) - u(t-13)\, f_2(t-13)$$

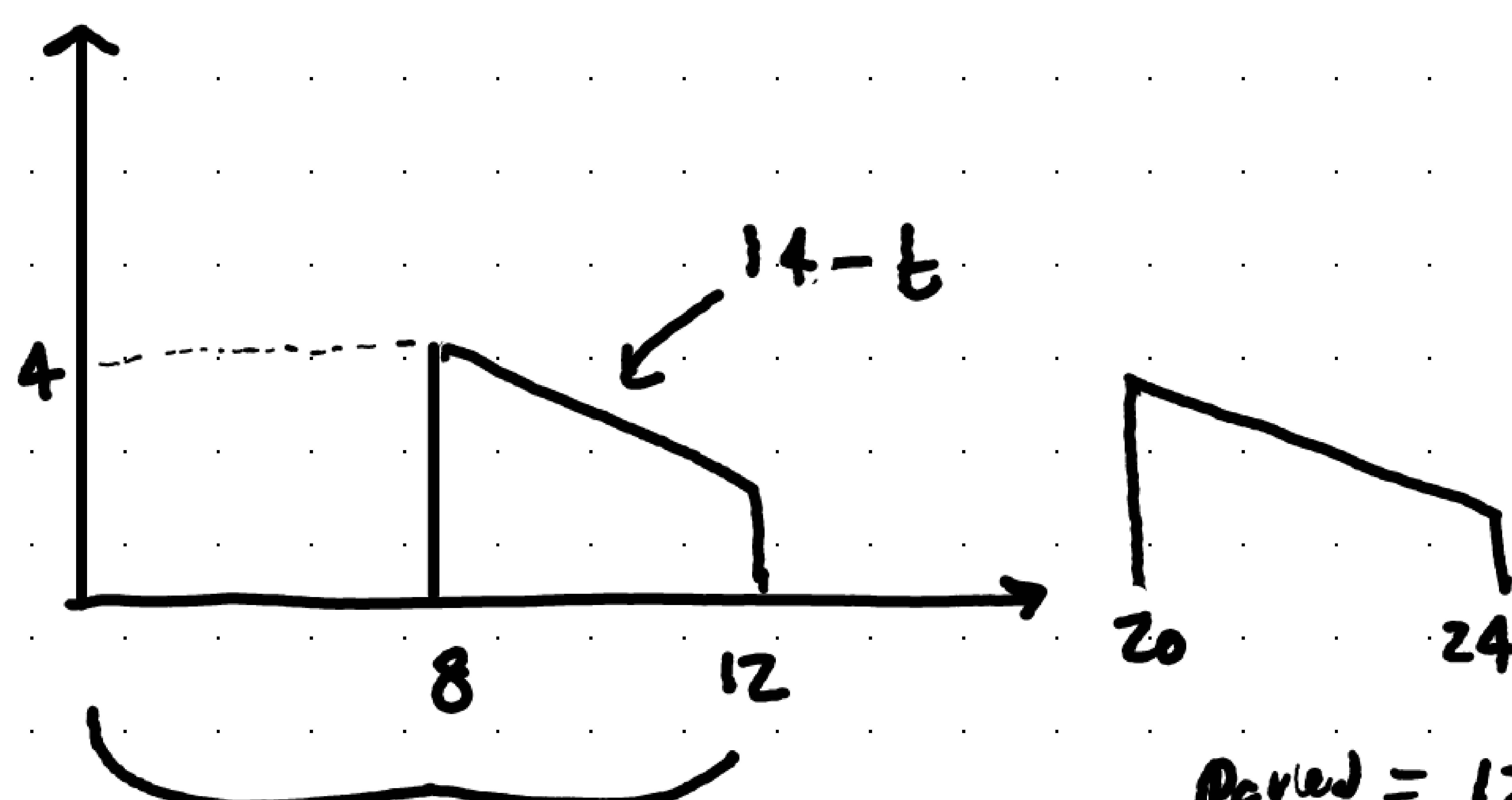


Zone Edges

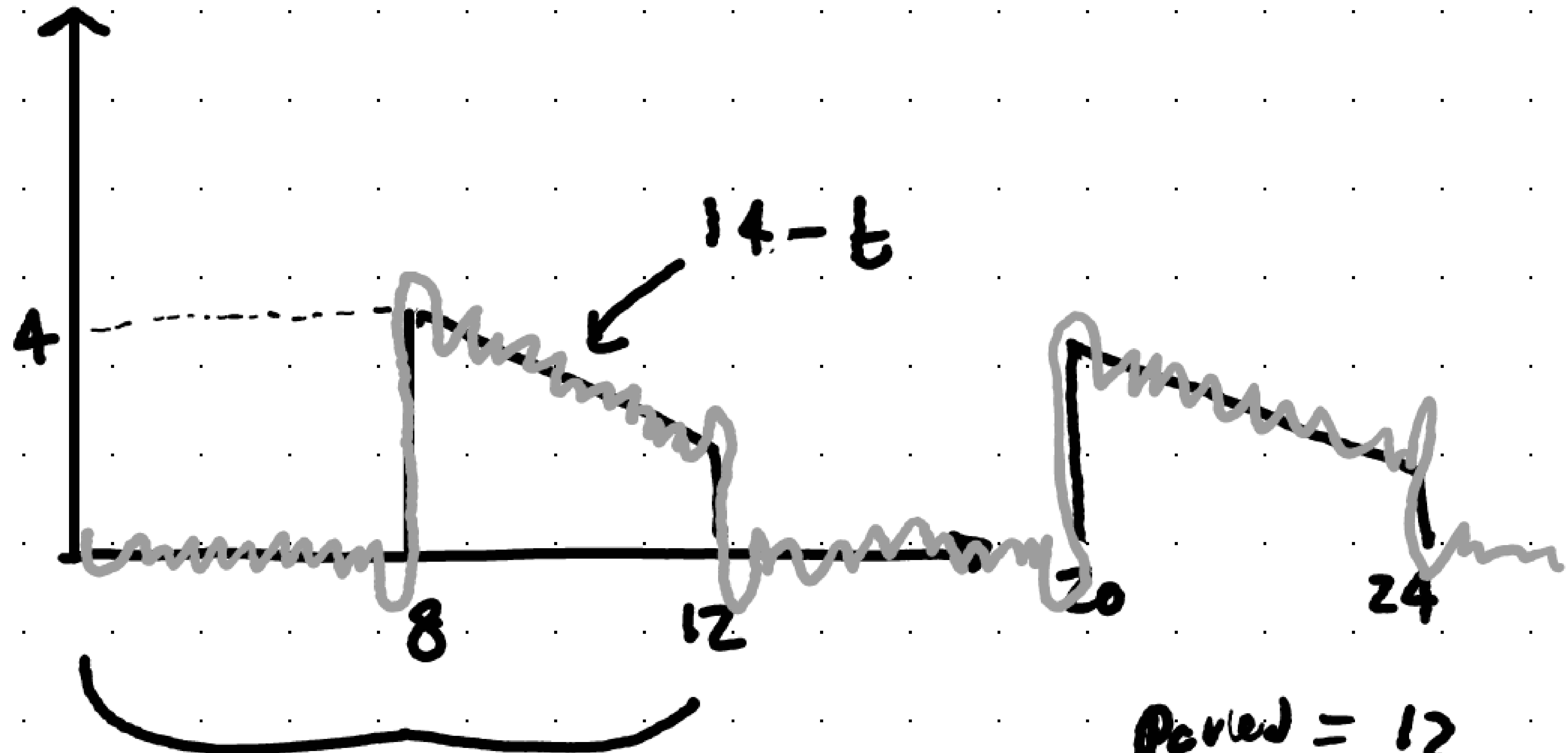
Fourier



period = 12
L = 6



period = 12
L = 6



period = 12

L = 6

Gibbs phenomenon!

All the little jumps!

$$
f(t) = \begin{cases} 14 - t & \text{on } 8 \le t \le 12 \\ 0 & \text{elsewhere in } 0 < t < 12 \end{cases}
$$

2L periodic

12- periodic