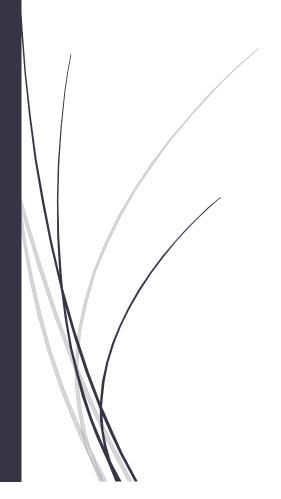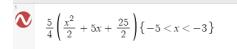18-5-2021

Evidencia 2.2

Martínez Coronel Brayan Yosafat

$$f_1(t) = \begin{cases} \frac{5}{4}(t+4) := l_1 \\ -\frac{5}{4}(t-4) := l_2 \end{cases} \qquad f_2 = 1 \quad -1 \le t \le 1 \qquad m = \frac{5}{4}$$

$$f_1 * f_2 = \int_{-4}^{t+1} l_1\, dt + \int_{t-1}^{t+1} l_1\, dt + \int_{t-1}^{0} l_1\, dt \int_{0}^{t+1} l_2\, dt + \int_{t-1}^{t+1} l_2\, dt + \int_{t-1}^{4} l_2\, dt$$

$$
\begin{array}{ccccc}
t+1 > -4 & t-1 > -4 & t+1 > 0 & t-1 > 0 & t-1 < 4 \\
t-1 < -4 & t+1 < 0 & t-1 < 0 & t+1 < 4 & t+1 > 4
\end{array}
$$

$$= \frac{5}{4}\left(\frac{x^2}{2}+4x\right)\Big|_{-4}^{t+1} + \frac{5}{4}\left(\frac{x^2}{2}+4x\right)\Big|_{t-1}^{t+1} + \frac{5}{4}\left(\frac{x^2}{2}+4x\right)\Big|_{t-1}^{0} - \frac{5}{4}\left(\frac{x^2}{2}-4x\right)\Big|_{0}^{t+1} + \frac{5}{4}\left(\frac{x^2}{2}-4x\right)\Big|_{t-1}^{t+1} - \frac{5}{4}\left(\frac{x^2}{2}-4x\right)\Big|_{t-1}^{4}$$

$$=\begin{cases}
\frac{5}{4}\left[\frac{(t+1)^2}{2}+4(t+1)-\frac{16}{2}+16\right] = \frac{5}{4}\left(\frac{t^2}{2}+t+\frac{1}{2}+4t+4+8\right) = \frac{5}{4}\left(\frac{t^2}{2}+5t+\frac{25}{2}\right) & -5 \le t \le -3 \\[2mm]
\frac{5}{4}\left[\frac{t^2+2t+1}{2}+\frac{8t+8}{2}-\frac{t^2-2t+1}{2}-\frac{8t-8}{2}\right] = \frac{5}{4}(2t+8) & -3 \le t \le -1 \\[2mm]
\frac{5}{4}\left(\frac{t^2-2t+1}{2}+\frac{8t-8}{2}\right)-\frac{5}{4}\left(\frac{t^2+2t+1}{2}-\frac{8t+8}{2}\right) = \frac{5}{4}(t^2-1) & -1 \le t \le 1 \\[2mm]
-\frac{5}{4}\left[\frac{t^2+2t+1}{2}-\frac{8t+8}{2}-\frac{t^2-2t+1}{2}+\frac{8t-8}{2}\right] = \frac{5}{4}(-2t+8) & 1 \le t \le 3 \\[2mm]
-\frac{5}{4}\left[\frac{16}{2}-16-\frac{(t-1)^2}{2}+4(t-1)\right] = -\frac{5}{4}\left(-8-\frac{t^2}{2}+t-\frac{1}{2}+4t-4\right) = \frac{5}{4}\left(\frac{t^2}{2}-5t+\frac{25}{2}\right) & 3 \le t \le 5
\end{cases}$$

1. $\frac{5}{4}\left(\frac{x^2}{2} + 5x + \frac{25}{2}\right)\{-5 < x < -3\}$

2. $\frac{5}{4}\left(2x + 8\right)\{-3 < x < -1\}$

3. $-\frac{5}{4}\left(x^2 - 7\right)\{-1 < x < 1\}$

4. $\frac{5}{4}\left(-2x + 8\right)\{1 < x < 3\}$

5. $\frac{5}{4}\left(\frac{x^2}{2} - 5x + \frac{25}{2}\right)\{3 < x < 5\}$

6.