1. $F(t) = |A\,\text{Sen}(t)|$

$$F(t) = \sum_{n=-\infty}^{\infty} C_n e^{in\omega t}$$

$$C_n = \frac{1}{2\pi}\int_0^{\pi} 2A\,\text{Sen}(t)\, e^{-int}\,dt \quad , \quad \begin{array}{l} U = \text{Sen}(t) \;,\; du = \cos(t)\,dt \\ dv = e^{-int}\,dt \;,\; v = -\dfrac{e^{-int}}{in} \end{array}$$

$$C_n = \frac{A}{\pi}\left[\overbrace{-\frac{e^{-int}\,\text{Sen}(t)}{in}\Bigg|_0^{\pi}}^{0} + \frac{1}{in}\int_0^{\pi} e^{-int}\cos(t)\,dt \right]$$

$$\begin{array}{l} U = \cos(t) \;,\; du = -\text{Sen}(t)\,dt \\ dv = e^{-int}\,dt \;,\; v = -\dfrac{e^{-int}}{in} \end{array}$$

$$\frac{A}{\pi}\int_0^{\pi} \text{Sen}(t)\, e^{-int}\,dt = \frac{A}{\pi i n}\left[-\frac{e^{-int}}{in}\cos(t)\Bigg|_0^{\pi} - \frac{1}{in}\int_0^{\pi} e^{-int}\,\text{Sen}(t)\,dt \right]$$

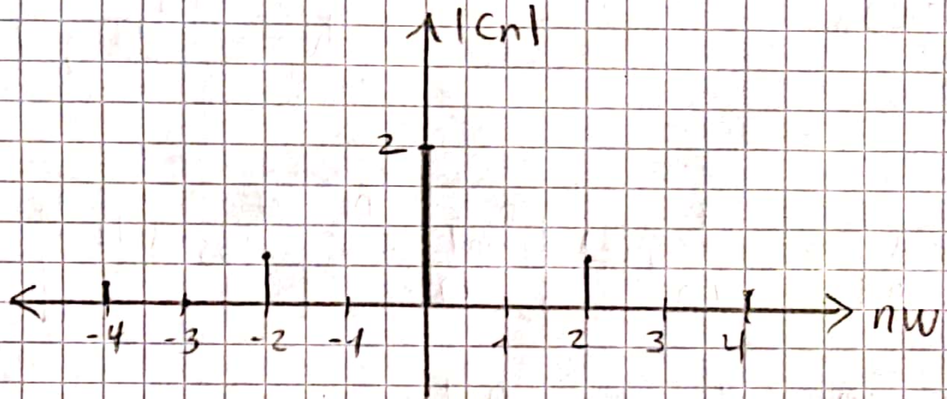
$$\frac{A}{\pi}\int_0^{\pi} \text{Sen}(t)\, e^{-int}\,dt = -\frac{A e^{-int}}{\pi i^2 n^2}\cos(t)\Bigg|_0^{\pi} - \frac{A}{\pi n^2 i^2}\int_0^{\pi} e^{-int}\,\text{Sen}(t)\,dt$$

$$\frac{A\pi n^2 i^2 + \pi A}{\pi^2 n^2 i^2}\int_0^{\pi} \text{Sen}(t)\, e^{-int}\,dt = \frac{A}{\pi i^2 n^2} + \frac{A e^{-in\pi}}{\pi i^2 n^2} = \frac{A(1+e^{-in\pi})}{\pi i^2 n^2}$$

$$\int_0^{\pi} \text{Sen}(t)\, e^{-int}\,dt = \frac{(-\cancel{\pi^2}\,\cancel{n^2})}{\cancel{\pi} A(1-n^2)} \cdot \frac{\cancel{A}(1+e^{-in\pi})}{\cancel{\pi} i^2 \cancel{n^2}} = \frac{1+e^{-in\pi}}{1-n^2}, \; n \neq \pm 1$$

$$F(t) = \sum_{n=-\infty}^{\infty} \left(\frac{1+e^{-in\pi}}{1-n^2} \right) e^{int}$$

n	-4	-3	-2	0	2	3	4
$\lvert C_n \rvert$	$\frac{2}{15}$	0	$\frac{2}{3}$	2	$\frac{2}{3}$	0	$\frac{2}{15}$



4.

$$f(t) = \begin{cases} A e^{-i/10} & si \quad -\pi < t < 0 \\ -A e^{i/10} & si \quad 0 < t < \pi \end{cases}$$

$$C_n = \frac{A}{2\pi}\left[\int_{-\pi}^{0} e^{-i/10} e^{-int}\, dt\right] + \frac{A}{2\pi}\left[\int_{0}^{\pi} e^{i/10} e^{-int}\, dt\right]$$

$$= \frac{A}{2\pi}\int_{-\pi}^{0} e^{-\frac{i+10int}{10}}\, dt - \frac{A}{2\pi}\int_{0}^{\pi} e^{\frac{i-10int}{10}}\, dt$$

$$= \frac{A}{2\pi}\left[-\frac{1}{in} e^{-\frac{1}{10}(i+10int)} \Big|_{-\pi}^{0}\right] - \frac{A}{2\pi}\left[-\frac{1}{in} e^{\frac{1}{10}(i-10int)} \Big|_{0}^{\pi}\right]$$

$$= \frac{-A}{2i\pi n}\left[e^{-i/10} - e^{-\frac{1}{10}(i-10\pi in)}\right] + \frac{A}{2i\pi n}\left[e^{\frac{1}{10}(i-10\pi in)} - e^{i/10}\right]$$

$$= \frac{-A}{2i\pi n}\left[-e^{i/10} - e^{-i/10} + e^{-\frac{1}{10}(i-10\pi in)} + e^{\frac{1}{10}(i-10\pi in)}\right]$$

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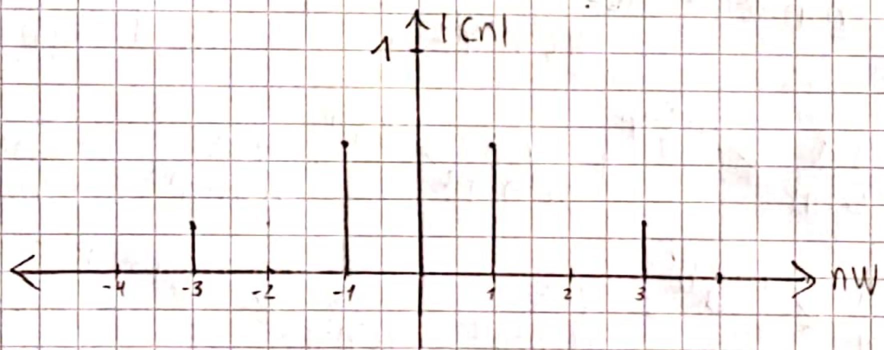
$$C_n = \sum_{n=-\infty}^{\infty} \left(\frac{-A}{2i\pi n}\left[-e^{i/10} - e^{-i/10} + e^{\frac{1}{10}(i-10\pi i n)} + e^{\frac{1}{10}(i-10\pi i n)}\right]\right) e^{i n t} \quad n \neq 0$$

$A = 1$

n	-4	-3	-2	-1	1	2	3	4
$\lvert C_n \rvert$	0	0,211	0	0,633	0,633	0	0,211	0



3.

$$f(t) = \begin{cases} At + A & \text{si } -1 \leq t < 0 \\ At - A & \text{si } 0 < t \leq 1 \\ 0 & \text{si } 1 \leq t \leq 2 \end{cases}$$

$$C_n = \frac{1}{3}\int_{-1}^{0} (At + A) e^{-in\frac{2}{3}\pi t}\, dt + \frac{1}{3}\int_{0}^{1} (At - A) e^{-in\frac{2}{3}\pi t}\, dt$$

$$= \frac{1}{3}\left[A\int_{-1}^{0} t e^{-in\frac{2}{3}\pi t}\, dt + A\int_{-1}^{0} e^{-in\frac{2}{3}\pi t}\, dt\right] + \frac{1}{3}\left[A\int_{0}^{1} t e^{-in\frac{2}{3}\pi t}\, dt + \right.$$

$$\left. - A\int_{0}^{1} e^{-in\frac{2}{3}\pi t}\, dt\right],$$

$$\boxed{\begin{array}{ll} u = t, & du = dt \\ dv = e^{-in\frac{2}{3}\pi t}\, dt, & v = -\frac{3}{2in\pi} e^{-in\frac{2}{3}\pi t} \end{array}}$$

$$= \frac{1}{3}\left[A\left(-\frac{3t}{2in\pi} e^{-in\frac{2}{3}\pi t}\Big|_{-1}^{0} + \frac{3}{2in\pi}\int_{-1}^{0} e^{-in\frac{2}{3}\pi t}\, dt\right) - \frac{3A}{2in\pi} e^{-in\frac{2}{3}\pi t}\Big|_{-1}^{0}\right.$$

$$\left.\right]$$

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$$+\frac{1}{3}\left[A\left(-\frac{3t}{2in\pi}e^{-in\frac{2}{3}\pi t}\Big|_0^1+\frac{3}{2in\pi}\int_0^1 e^{-in\frac{2}{3}\pi t}dt\right)+\frac{3A}{2in\pi}e^{-in\frac{2}{3}\pi t}\Big|_0^1\right]$$

$$=\frac{1}{3}\left[-\frac{3A}{2in\pi}e^{in\frac{2}{3}\pi}-\frac{9A}{4i^2n^2\pi^2}e^{-in\frac{2}{3}\pi t}\Big|_{-1}^{0}-\left(\frac{3A}{2in\pi}-\frac{3A}{2in\pi}e^{in\frac{2}{3}\pi}\right)\right]$$

$$+\frac{1}{3}\left[\frac{-3A}{2in\pi}e^{-in\frac{2}{3}\pi}-\frac{9A}{4i^2n^2\pi^2}e^{-in\frac{2}{3}\pi t}\Big|_0^1+\frac{3A}{2in\pi}e^{-in\frac{2}{3}\pi t}-\frac{3A}{2in\pi}\right]$$

$$=\frac{1}{3}\left[-\frac{3A}{2in\pi}e^{in\frac{2}{3}\pi}+\frac{9A}{4i^2n^2\pi^2}e^{in\frac{2}{3}\pi}-\cancel{\frac{9A}{4i^2n^2\pi^2}}-\frac{3A}{2in\pi}+\frac{3A}{2in\pi}e^{in\frac{2}{3}\pi}\right]$$

$$+\frac{1}{3}\left[\frac{-3A}{2in\pi}e^{-in\frac{2}{3}\pi}+\cancel{\frac{9A}{4i^2n^2\pi^2}}-\frac{9A}{4i^2n^2\pi^2}e^{-in\frac{2}{3}\pi}+\frac{3A\,e^{-in\frac{2}{3}\pi t}}{2in\pi}-\frac{3A}{2in\pi}\right]$$

$$=\frac{1}{3}\left[\frac{-3A}{2in\pi}\left(e^{in\frac{2}{3}\pi}+e^{-in\frac{2}{3}\pi}\right)+\frac{9A}{4i^2n^2\pi^2}\left(e^{in\frac{2}{3}\pi}-e^{-in\frac{2}{3}\pi}\right)\right.$$

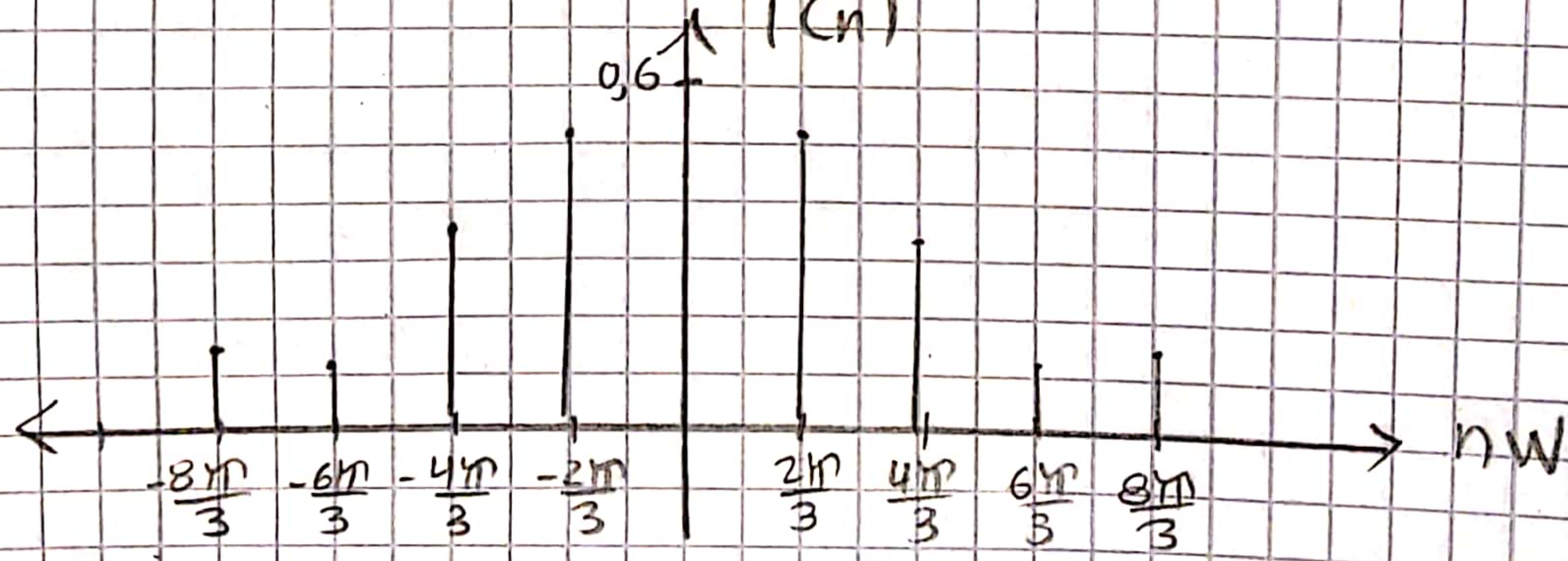
$$\left.-\frac{3A}{in\pi}+\frac{3A}{2in\pi}\left(e^{in\frac{2}{3}\pi}+e^{-in\frac{2}{3}\pi}\right)\right]$$

$$f(t)=\sum_{n=-\infty}^{\infty}\left[\frac{1}{3}\left(\frac{-3A}{2in\pi}\left(e^{in\frac{2}{3}\pi}+e^{-in\frac{2}{3}\pi}\right)+\frac{9A}{4i^2n^2\pi^2}\left(e^{in\frac{2}{3}\pi}-e^{-in\frac{2}{3}\pi}\right)\right.\right.$$

$$\left.\left.-\frac{3A}{in\pi}+\frac{3A}{2in\pi}\left(e^{in\frac{2}{3}\pi}+e^{-in\frac{2}{3}\pi}\right)\right)\right]e^{in\frac{2}{3}\pi t},\quad n\neq 0$$

$A=1$

n	-4	-3	-2	-1	1	2	3	4
$\lvert C_n\rvert$	0,15	0,11	0,351	0,504	0,504	0,351	0,11	0,15



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