función cumpla con la
continuidad $\Rightarrow$ 1) $f(x_0) \in \text{Dom} f$
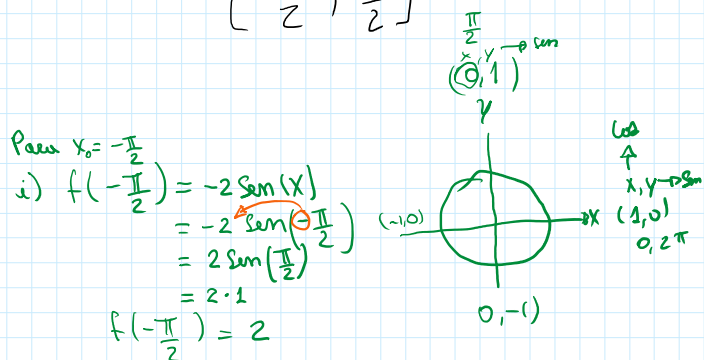2) $\lim\limits_{x \to x_0} f(x) \Rightarrow \lim\limits_{x \to x_0^-} f(x) = \lim\limits_{x \to x_0^+} f(x)$
3) 1) = 2)

2) Determinar A y B de modo que f sea continua
en todo su Dominio

$$f(x) = \begin{cases} -2\operatorname{Sen}(x), & x \le -\dfrac{\pi}{2} \to \text{Dom} f_1 \\ A\operatorname{Sen}(x) + B, & -\dfrac{\pi}{2} < x < \dfrac{\pi}{2} \quad \text{Dom} f_2 \\ \cos(x), & x \ge \dfrac{\pi}{2} \quad \text{Dom} f_3 \end{cases}$$

$$\text{Dom } f = \left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$$

$\frac{\pi}{2}$
$x, y \to \operatorname{sen}$
$(0,1)$

$\cos$
$x, y \to \operatorname{sen}$
$(1,0)$
$0, 2\pi$

$(-1,0)$

$0, -1$

Para $x_0 = -\dfrac{\pi}{2}$

i) $f\left(-\dfrac{\pi}{2}\right) = -2\operatorname{Sen}(x)$
$= -2\operatorname{Sen}\left(-\dfrac{\pi}{2}\right)$
$= 2\operatorname{Sen}\left(\dfrac{\pi}{2}\right)$
$= 2 \cdot 1$
$f\left(-\dfrac{\pi}{2}\right) = 2$

ii) $\lim\limits_{x \to -\frac{\pi}{2}^+} f(x) = \lim\limits_{x \to -\frac{\pi}{2}^-} f(x)$
         ①   ②

① $\lim\limits_{x \to -\frac{\pi}{2}^+} A\operatorname{Sen}(x) + B = A\operatorname{Sen}\left(-\dfrac{\pi}{2}\right) + B = -A\operatorname{Sen}\left(\dfrac{\pi}{2}\right) + B = -A + B$

$\left. \lim\limits_{x \to x_0^+} = \lim\limits_{x \to x_0^-} \right.$
$\boxed{-A + B = 2}$ (✱)

② $\lim\limits_{x \to -\frac{\pi}{2}^-} -2\operatorname{Sen}(x) = -2\operatorname{Sen}\left(-\dfrac{\pi}{2}\right) = 2\operatorname{Sen}\dfrac{\pi}{2} = 2$

✓ iii) i) = ii)

$\to$ Para $x = \dfrac{\pi}{2}$

i) $f\left(\dfrac{\pi}{2}\right) = \cos(x) = \cos\left(\dfrac{\pi}{2}\right) = 0$

ii) $\lim\limits_{x \to \frac{\pi}{2}} f(x) \Leftrightarrow \lim\limits_{x \to \frac{\pi}{2}^-} f(x) = \lim\limits_{x \to \frac{\pi}{2}^+} f(x)$
                                   ⓐ   ⓑ

ⓐ $\lim\limits_{x \to \frac{\pi}{2}^-} A\operatorname{Sen} x + B = A\operatorname{Sen}\dfrac{\pi}{2} + B$
$= A + B$

$A + B = 0$ (✱)(✱)

ⓑ $\lim\limits_{x \to \frac{\pi}{2}^+} \cos x = \cos\left(\dfrac{\pi}{2}\right) = 0$

Sistema Ecc. ⊗ $-A + B = 2$ ⊛ $-A + B = 2$
⊗⊗ $A + B = 0$ $-A + 1 = 2$
$0 + 2B = 2$ $-A = 1 / (-1)$
$\boxed{B = 1}$ $\boxed{A = -1}$

Caso particular!
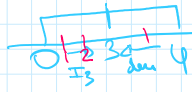
$$f(x) = \begin{cases} -2\operatorname{Sen}(x) , & x \leq -\dfrac{\pi}{2} \\ -\operatorname{Sen}(x) + 1 , & -\dfrac{\pi}{2} < x < \dfrac{\pi}{2} \\ \operatorname{Cos} x , & x \geq \dfrac{\pi}{2} \end{cases}$$

$\boxed{x = 3}$

$f(x) \begin{cases} 2x + 1 , & 0 \leq x \leq 4 \\ 3x^2 , & 4 < x \leq 10 \end{cases}$ → to Dom.

$0 \;|\; 1 \; 2 \; 3 \; 4 \;|$
$\qquad I_3 \quad$ der 4

$\lim\limits_{x \to 3^-} 2x + 1 = \lim\limits_{x \to 3^+} 2x + 1$

$x = -\dfrac{\pi}{2}$

i) $f\left(-\dfrac{\pi}{2}\right) = -2\operatorname{Sen}(x) = -2\operatorname{Sen}\left(-\dfrac{\pi}{2}\right) = 2$

ii) $\lim\limits_{x \to -\frac{\pi}{2}^-} f(x) = \lim\limits_{x \to -\frac{\pi}{2}^+} f(x)$

$$= -A + B$$
$$= -(-1) + 1$$
$$2 = 1 + 1 = 2$$
$$2 = 2$$

iii) $\therefore \exists \lim\limits_{x \to -\frac{\pi}{2}} f(x)$ y es continua en $x = -\dfrac{\pi}{2}$

$x = \dfrac{\pi}{2}$

i) $f\left(\dfrac{\pi}{2}\right) = 0$

ii) $\lim\limits_{x \to \frac{\pi}{2}^-} f(x) = \lim\limits_{x \to \frac{\pi}{2}^+} f(x)$

$$A + B = 0$$
$$-1 + 1 = 0$$
$$0 = 0$$

$\exists \lim\limits_{x \to \frac{\pi}{2}} f(x)$

iii) $\lim\limits_{x \to \pi} f(x) \; \exists$ y es continua en $x = \dfrac{\pi}{2}$

iii) $\lim\limits_{x \to \frac{\pi}{2}} f(x)$ ∃ y es continua   2

∴ $f(x)$ es continua en todo su Dominio
para $A = -1$ y $B = 1$.