(5)

f cont $[1,9]$

$f(1) = -5$

$f(9) > 0$

$g(x) = f(x) + 3 = 0$ en $[1,9]$

Aplicar Bolzano a g

g cont $[1,9]$ dado pues f cont en $[1,9]$

$g(1) = f(1) + 3 = -5 + 3 = -2 < 0$

$g(9) = f(9) + 3 > 0$

Sis $g(1) \neq \text{sig } g(9)$

Bolzano $\Rightarrow \exists\, c \in (1,9) \Rightarrow g(c) = 0$

existe pertenece tal que

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(6) $f(x) = \text{sen } \frac{\pi}{4} x$

$c \in (0,4)$ $f(a) = f(c+1)$

$f(c) - f(c+1) = 0$

$h(x) = f(x) - f(x+1)$ BOLZANO

h cont $[0,4]$ dado pues f cont en $\mathbb{R}$

$h(0) = f(0) - f(1) = \text{sen } 0 - \text{sen } \frac{\pi}{4}$

$= 0 - \frac{\sqrt{2}}{2} = -\frac{\sqrt{2}}{2} < 0$

$h(4) = f(4) - f(5) = \text{sen } \pi - \text{sen } \frac{5\pi}{4}$

$= 0 - \left(-\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{2} > 0$

Sis $h(0) \neq \text{sig } h(4)$

Bolzano $\Rightarrow \exists\, c \in (0,4) \Rightarrow h(c) = 0$

$f(c) - f(c+1) = 0$

$f(c) = f(c+1)$

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(7) $f(x) = x + e^{-x}$

$\exists\, c \Rightarrow c + e^{-c} = 4$

$c + e^{-c} - 4 = 0$

$h(x) = x + e^{-x} - 4$ BOLZANO

h cont en $\mathbb{R}$

$h(0) = 0 + e^{-0} - 4 = 1 - 4 = -3 < 0$

$h(4) = 4 + e^{-4} - 4 = e^{-4} > 0$

h cont en $[0,4]$, Bolzano, Sis $h(0) \neq \text{sig } h(4)$

$\exists\, c \in (0,4) \Rightarrow h(c) = 0$

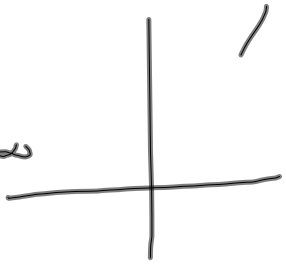
$c + e^{-c} - 4 = 0$

$c + e^{-c} = 4$

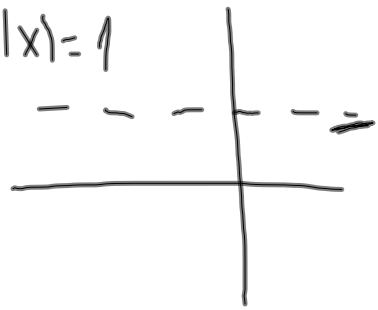
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(8)

a) $\lim_{x \to +\infty} f(x) = +\infty$



b) $\lim_{x \to +\infty} f(x) = 1$



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