



**Universidad Del Sureste Campus
Comitán De Domínguez,
Chiapas
Licenciatura En Medicina Humana**



Tema: Ejercicios de limites

Materia: Biomatemáticas

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Grupo: B

Grado: 2

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BIOMATEMÁTICAS

$$\lim_{x \rightarrow a} f(x) = L$$

- $\lim_{x \rightarrow 2} x^2 > \lim_{x \rightarrow 2} x^2 - (2)^2 = 4$

Ejercicios

$$\begin{aligned} \rightarrow \lim_{x \rightarrow 2.5} x^2 \\ (2.5)^2 = \underline{6.25} \end{aligned}$$

$$\begin{aligned} \rightarrow \lim_{x \rightarrow 1.5} x^2 \\ (1.5)^2 = \underline{2.25} \end{aligned}$$

$$\begin{aligned} \rightarrow \lim_{x \rightarrow 3} x^2 \\ (3)^2 = \underline{9} \end{aligned}$$

$$\begin{aligned} \rightarrow \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} &= \frac{(x+1)(x-1)}{x-1} \\ \lim_{x \rightarrow 1} &= \frac{(x+1)(x-1)}{x-1} \\ &= 1 + 1 \\ &= \underline{2} \end{aligned}$$

- Si nos da 0 es una forma indeterminada.

Ejercicios

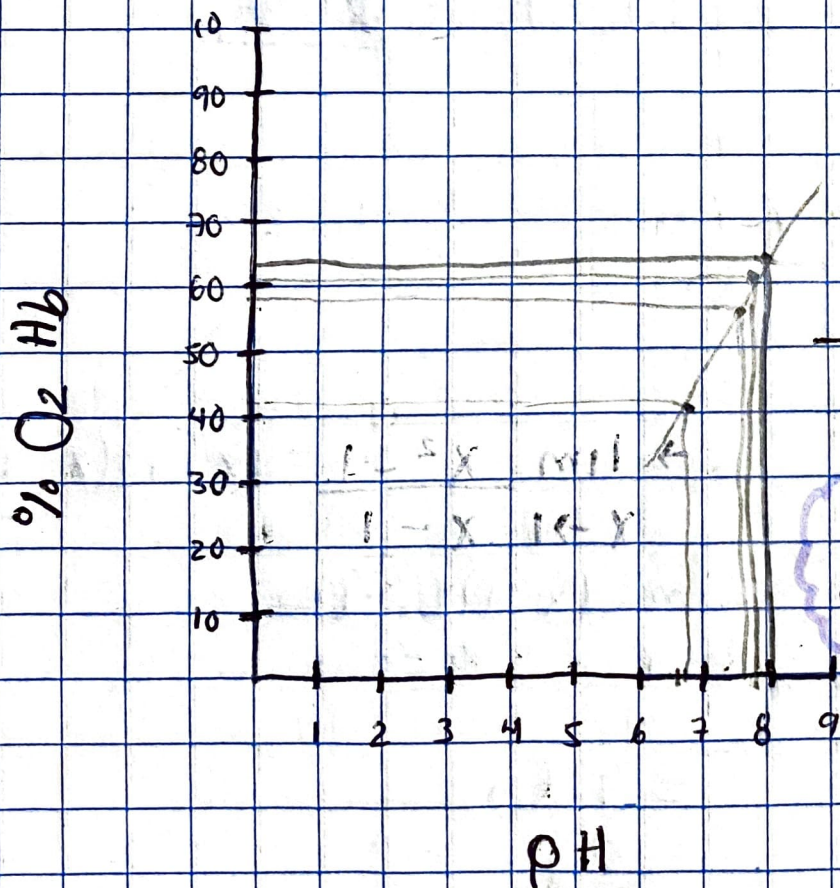
= CLASE =

• pH 6.6
 $\lim_{x \rightarrow 6.6} x^2 = (6.6)^2 = 43.56$

• pH 7.6
 $\lim_{x \rightarrow 7.6} x^2 = (7.6)^2 = 57.76$

• pH 7.8
 $\lim_{x \rightarrow 7.8} x^2 = (7.8)^2 = 60.84$

• pH 8
 $\lim_{x \rightarrow 8} x^2 = (8)^2 = 64$



$(7.6)^3 = 438.976$
 $(7.8)^3 = 474.552$
 $(8)^4 = 4,096$

Leer

Cuando tenemos un pH de 8 saturamos a un 64%

→ No puede pasar del 100

Lim x^3
 $x = 7.6 = (7.6)^3 = 438.97$

MCD
 Simplificar con MCD

Lim x^3
 $x = 7.8 = (7.8)^3 = 474.55$

Utilizar regla de 3 (utilizando el pH como nuestro 100%)

Lim x^4
 $x = 8 = (8)^4 = 4096$

$439 \mid 2$

$474 \mid 2$
 $237 \mid 3$
 79

$4096 \mid 2$
 $2048 \mid 2$
 $1024 \mid 2$
 $512 \mid 2$
 $256 \mid 2$
 $128 \mid 2$
 $64 \mid 2$
 $32 \mid 2$
 $16 \mid 2$
 $8 \mid 2$
 $4 \mid 2$
 $2 \mid 2$
 1

430

$100 - 100$
 $2 -$

$8 - 100\%$
 $2 - 125\%$

- Oxigenamos 100% si llega sobre pasar simoficar con MCD y utilizar regla de 3 sabiendo que el pH es nuestro 100%.

Ejercicios:

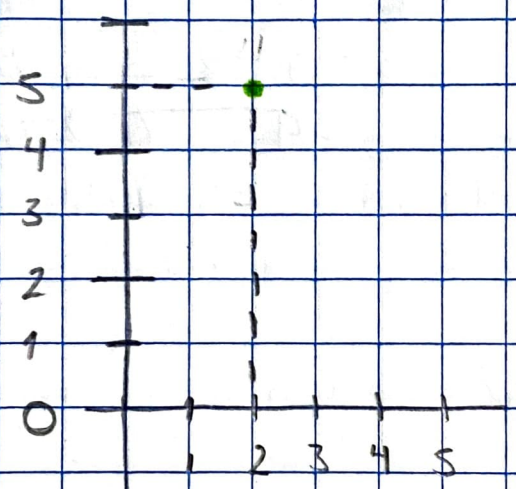
• $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$

Sus $\frac{(2)^2 + 2 - 6}{2 - 2}$

Sus. $\frac{4 + 2 - 6}{0}$

Sus = $\frac{6 - 6}{0} = \frac{0}{0}$

$\lim = \frac{(x-2)(x+3)}{(x-2)} = (x+3)$
 $= 2 + 3 = \underline{\underline{5}}$

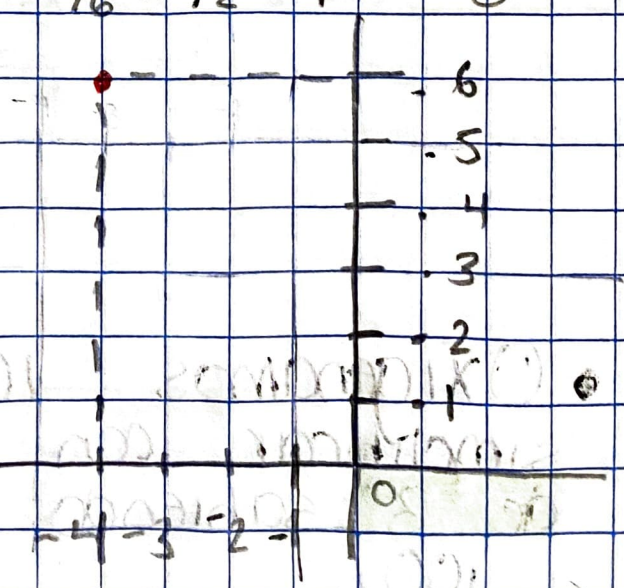


• $\lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4}$

Sus = $\frac{(-4)^2 + 5(-4) + 4}{(-4)^2 + 3(-4) - 4}$

$= \frac{16 - 20 + 4}{16 - 12 - 4} = \frac{0}{0}$

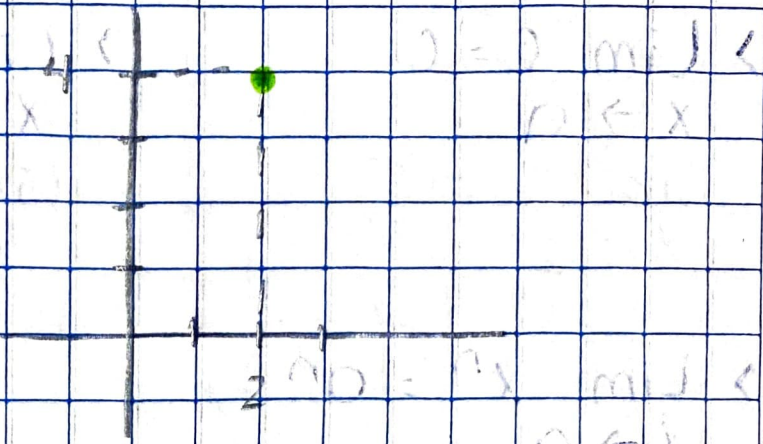
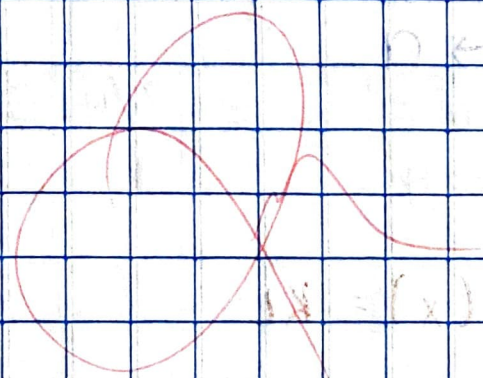
$\lim = \frac{(x+4)(x+1)}{(x-1)(x+4)}$
 $= \frac{(x+1)}{(x-1)} = \frac{(-4+1)}{(-4-1)}$
 $= \frac{-3}{-5} = \underline{\underline{.6}}$



• $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$ Sub: $(2)^2 - 4 = 4 - 4 = 0$

$\lim_{x \neq 2} \frac{(x - 2)(x + 2)}{x - 2}$

$= (x + 2) = 2 + 2 = 4$



PROPIEDADES DE LOS LÍMITES

$\lim_{x \rightarrow a} c = c$

$\lim_{x \rightarrow 2} 5 = 5$

$\lim_{x \rightarrow a} x = a$

$\lim_{x \rightarrow 2} x = 2$

$\lim_{x \rightarrow a} x^n = a^n$

$\lim_{x \rightarrow 2} x^2 = (2)^2 = 4$

$\lim_{x \rightarrow a} \sqrt[n]{x} = \sqrt[n]{a}$

$\lim_{x \rightarrow 4} \sqrt{x} = \sqrt{4} = 2$

$\lim_{x \rightarrow a} k[f(x)] = k \lim_{x \rightarrow a} f(x) = kL$

$\lim_{x \rightarrow 3} 9x^2$

$k = 9 \lim_{x \rightarrow 3} x^2 = 9(3)^2 = 9(9) = 81$

$\lim_{x \rightarrow 8} 6x^2$

$k = 6(8)^2 = 6(64) = 384$

Practical -> Ph utilizar como x y constante

¿Sat 0? Hb?

$\lim_{x \rightarrow 6} 80(x)$

$\lim_{x \rightarrow 6} 80(x)$

x = k
ph = 6
ph = 9
S.S

ρ 0² mm Hg
k = 80

Ejercicio

• Cuando el pH es 6 tiene una saturación de 36%.

¿Sat O₂ Hb?

• pH 6
 $\lim_{x \rightarrow 6} 6(x)$

• pH 9
 $\lim_{x \rightarrow 9} 9(x)$

• pH 5.5
 $\lim_{x \rightarrow 5.5} 5.5(x)$

$6 \lim(x)$
 $x \rightarrow 6$

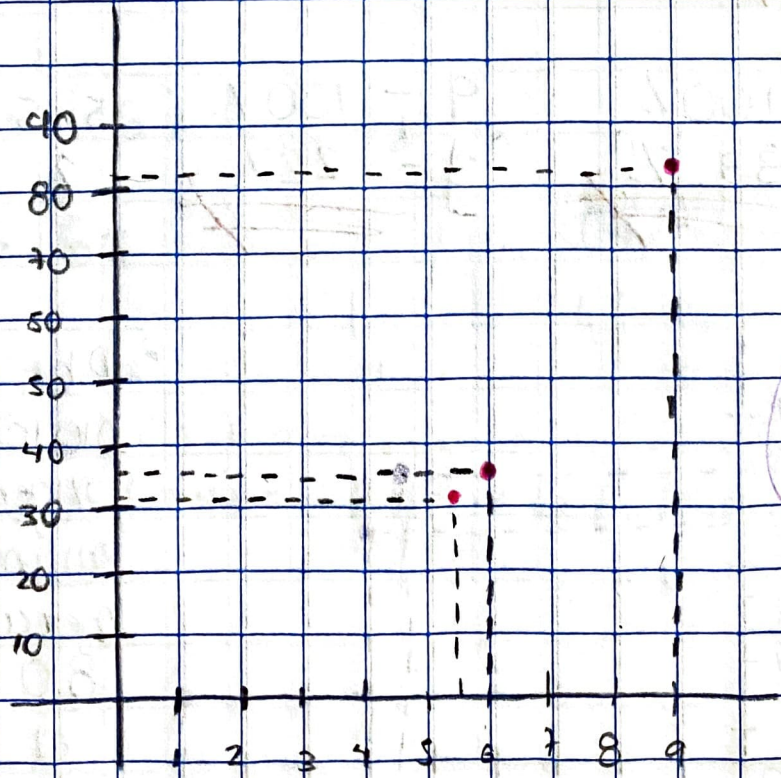
$9 \lim(x)$
 $x \rightarrow 9$

$5.5 \lim(x)$
 $x \rightarrow 5.5$

~~$6(6) = 36$~~

~~$9(9) = 81$~~

~~$5.5(5.5) = 30.25$~~



PO2 mm

Hg

• pH 6

• pH 9

Lim 80 (x)

Lim 80 (x)

x → 6

x → 9

80 Lim (x)

~~80 (6) = 480~~

80 Lim (x)

~~80 (9) = 720~~

• pH 5.5

4 800 | 2

7 200 | 2

Lim 80 (x)

2 400 | 2

3 600 | 2

x → 5.5

1 200 | 2

1 800 | 2

80 Lim (x)

~~80 (5.5) = 440~~

600 | 2

900 | 2

300 | 2

300 | 2

150 | 3

150 | 3

55 | 5

55 | 5

1

1

4 400 | 2

6 - 100%

9 - 100%

5.5 - 100%

2 200 | 2

~~2 - 33.3%~~

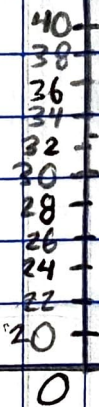
~~2 - 22%~~

~~2 - 36%~~

1 100 | 2

55 | 5

11 | 11



• Dn de 9 y presión de oxígeno por milímetro de mercurio a 80 saturamos a 22%.

0 1 2 3 4 5 6 7 8 9

$$2. \lim_{x \rightarrow a} f(x) \pm g(x) = \lim_{x \rightarrow a} f(x) \pm \lim_{x \rightarrow a} g(x) = L \pm M$$

$$\lim_{x \rightarrow 2} 3x + 4x \quad \text{Sub: } \lim (3)(2) + 4(2) = 6 + 8 = \underline{14}$$

$$\lim 3(2) + \lim 4(2) = \lim 6 + \lim 8 = \underline{14}$$

$$3. \lim_{x \rightarrow a} f(x) \cdot g(x) = \lim_{x \rightarrow a} f(x) \cdot \lim_{x \rightarrow a} g(x) = L \cdot M$$

$$\lim_{x \rightarrow 2} 4x + 3x \quad \text{Sub: } \lim 4(2) + 3(2) = (8) + (6) = \underline{14}$$

$$4. \lim_{x \rightarrow 2} 2 \cdot \lim_{x \rightarrow 2} 2$$

$$(8) \cdot (6) = \underline{48}$$

$$\lim_{x \rightarrow 4} 3x \cdot 6x \quad \lim 3(4) \cdot 6(4) = 12 \cdot 24 = \underline{288}$$

$$3. \lim_{x \rightarrow 4} 4 \cdot 6 \lim_{x \rightarrow 4} 4 = (12) \cdot (24) = \underline{288}$$

$$\lim_{x \rightarrow a} f(x) = g(x) = \lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow a} g(x) = L = M, M \neq 0$$

$$\lim_{x \rightarrow 4} \frac{3x}{4x}$$

$$\text{Sub: } \frac{3(4)}{4(4)} = \frac{12}{16} = 0.75$$

$$\lim_{x \rightarrow 4} \frac{3x}{4x} = \frac{3(4)}{4(4)} = \frac{12}{16} = \underline{\underline{0.75}}$$

$$\lim_{x \rightarrow 4} \frac{3x}{4x}$$

$$\lim_{x \rightarrow 5} \frac{3x - 12}{4x - 19}$$

$$\frac{3(5) - 12}{4(5) - 19} = \frac{15 - 12}{20 - 19} = \frac{3}{1} = \underline{\underline{3}}$$

$$\lim_{x \rightarrow a} [f(x)]^n = \left[\lim_{x \rightarrow a} f(x) \right]^n$$

$$\lim_{x \rightarrow 3} 2x^3 = ((2)(3))^3 = (6)^3 = \underline{\underline{216}}$$

$$\lim_{x \rightarrow 3} 2(3)^3 = \left[\lim_{x \rightarrow 3} 6 \right]^3 = \underline{\underline{216}}$$

$$\lim_{x \rightarrow a} \sqrt[n]{x} = \lim_{x \rightarrow a} \sqrt[n]{a}$$

$$\lim_{x \rightarrow 2} \sqrt[3]{4x} = \sqrt[3]{4(2)} = \sqrt[3]{8} = \underline{\underline{2}}$$

Límites Laterales

- Cuando x se acerca a C por la derecha.

$$\lim_{x \rightarrow a^+} f(x)$$

0

$$\lim_{x \rightarrow 0^+} \frac{|x|}{x}$$

- Cuando x se acerca a C por la izquierda.

$$\lim_{x \rightarrow 0^-} f(x)$$

0

$$\lim_{x \rightarrow 0^-} \frac{|x|}{x}$$

Ejemplo.

Calcular $\lim_{x \rightarrow 2} f(x)$

$$(2)^2 = 4$$

4 \rightarrow Constante

$$f(x) = \begin{cases} x^2 & \text{si } x < 2 \\ 4 & \text{si } x = 2 \text{ - constante} \\ 6 - 2x & \text{si } x > 2 \end{cases}$$

$$6 - 2(2) = 6 - 4 = 2$$

$$\begin{cases} 4 & \text{si } x = 2 \text{ - constante} \\ 6 - 2x & \text{si } x > 2 \end{cases}$$

