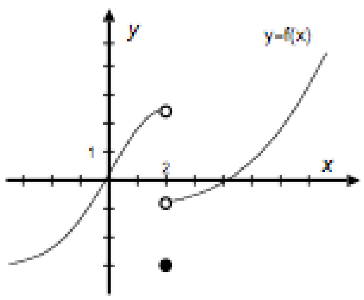
1.– En los ejercicios siguientes se consideran un número c y la gráfica de una función f. Utilizar la gráfica de f para hallar.

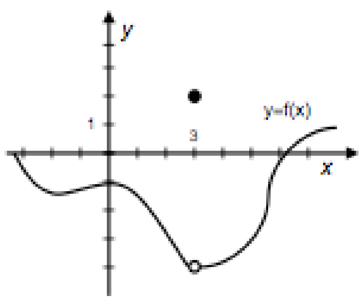
a.– $\lim\limits_{x\to c^-} f(x)$ b.– $\lim\limits_{x\to c^+} f(x)$ c.– $\lim\limits_{x\to c} f(x)$ d.– $f(c)$

1. $c = 2$



$\lim\limits_{x\to c^-} f(x) = 2.5$
$\lim\limits_{x\to c^+} f(x) = -1$
$\nexists \lim\limits_{x\to c} f(x)$
$f(c) = -3$

2. $c = 3$



$\lim\limits_{x\to c^-} f(x) = -4$
$\lim\limits_{x\to c^+} f(x) = -4$
$\lim\limits_{x\to c} f(x) = -4$
$f(c) = 2$

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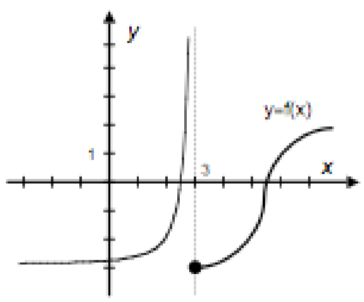
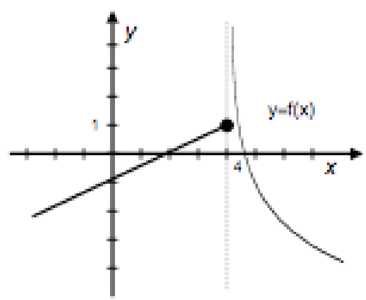
3. $c = 3$



$\lim\limits_{x\to c^-} f(x) = +\infty$
$\lim\limits_{x\to c^+} f(x) = -3$
$\nexists \lim\limits_{x\to c} f(x)$
$f(c) = -3$

4. $c = 4$



$\lim\limits_{x\to c^-} f(x) = 1$
$\lim\limits_{x\to c^+} f(x) = +\infty$
$\nexists \lim\limits_{x\to c} f(x)$
$f(c) = 1$

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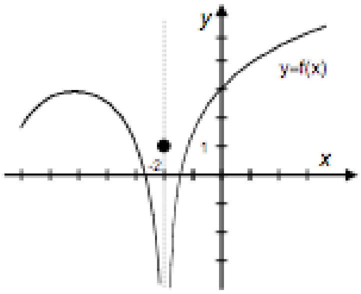
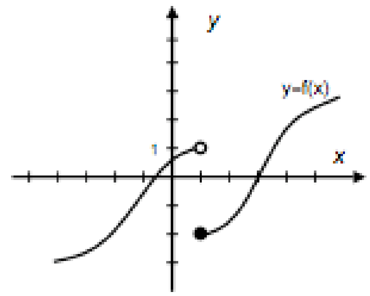
5. $c = -2$



$\lim_{x \to c^-} f(x) = -\infty$
$\lim_{x \to c^+} f(x) = -\infty$
$\lim_{x \to c} f(x) = -\infty$
$f(c) = 1$

6. $c = 1$



$\lim_{x \to c^-} f(x) = 1$
$\lim_{x \to c^+} f(x) = -2$
$\nexists \lim_{x \to c} f(x)$
$f(c) = -2$

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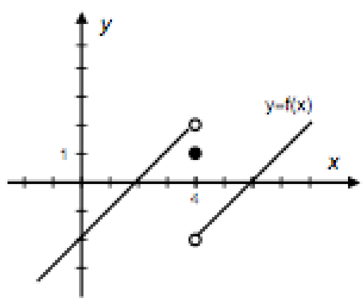
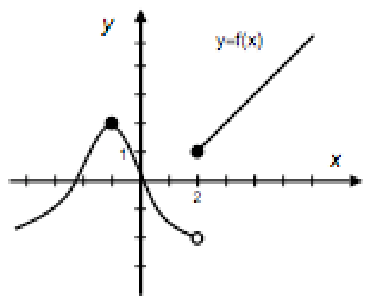
7. $c = 4$



$\lim_{x \to c^-} f(x) = 2$
$\lim_{x \to c^+} f(x) = -2$
$\nexists \lim_{x \to c} f(x)$
$f(c) = 1$

8. $c = 2$



$\lim_{x \to c^-} f(x) = -2$
$\lim_{x \to c^+} f(x) = 1$
$\nexists \lim_{x \to c} f(x)$
$f(c) = 1$

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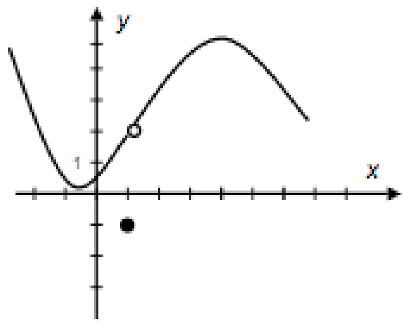
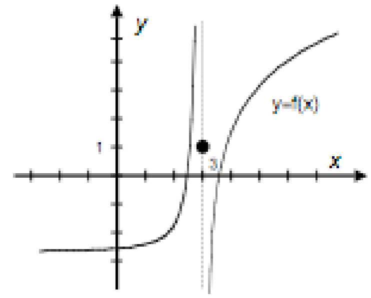
9. $c = 1$



$$\lim_{x\to c^-} f(x) = 2$$
$$\lim_{x\to c^+} f(x) = 2$$
$$\lim_{x\to c} f(x) = 2$$
$$f(c) = -1$$

10. $c = 3$



$$\lim_{x\to c^-} f(x) = +\infty$$
$$\lim_{x\to c^+} f(x) = -\infty$$
$$\nexists \lim_{x\to c} f(x)$$
$$f(c) = 1$$

2.– Calcular, si es que existen, los siguientes límites:

a.– $\lim_{x\to -3}(|x| - 2) = 1$; b.–$\nexists \lim_{x\to 2} \dfrac{1}{3x-6}$; c.– $\lim_{x\to 1} \dfrac{x^3-1}{x-1} = 3$

d.–$\nexists \lim_{x\to 0} \dfrac{|x|}{x}$; e.– $\lim_{x\to 2} \dfrac{x-2}{\sqrt{x-1}-1} = 2$; f.– $\lim_{x\to 1^+} \dfrac{\sqrt{x-1}}{x} = 0$

g.– $\lim_{x\to +\infty} \dfrac{x^3-1}{2x^3-1} = \dfrac{1}{2}$; h.– $\lim_{x\to +\infty} \dfrac{x^3-1}{2x^2-1} = +\infty$; i.– $\lim_{x\to +\infty} \dfrac{x^3-1}{2x^4-1} = 0$

3.– Determinar, si existen o no los límites indicados. Calcular los límites que existan:

$$\text{a.– } \lim_{x\to 2} f(x) \quad \text{siendo } f(x) = \begin{cases} 2x-1, & x \le 2 \\ x^2 - x, & x > 2. \end{cases}$$

$$\text{b.– } \lim_{x\to 3} f(x) \quad \text{siendo } f(x) = \begin{cases} \dfrac{x^2-x-6}{\sqrt{x+1}-2}, & x < 3 \\ 7, & x = 3 \\ 2x+3, & x > 3 \end{cases}$$

<u>*Solución*</u>

a.–$\nexists \lim_{x\to 2} f(x)$

b.–$\nexists \lim_{x\to 3} f(x)$

4.– Calcular los límites siguientes:

a.– $\lim\limits_{x\to 0} \dfrac{e^x - 1}{e^{2x} - e^x} = 1$ b.– $\lim\limits_{x\to 0} \dfrac{\tan x}{e^{2x} - e^x} = 1$ c.– $\lim\limits_{x\to 0} \dfrac{e^{1/x^2} - 1}{\ln \frac{x+1}{x}} = \infty$

d.– $\lim\limits_{x\to +\infty} \dfrac{6 \cdot 2^x}{2^x - 3} = 6$ e.– $\lim\limits_{x\to +\infty} \sqrt[x]{x} = 1$ f.– $\lim\limits_{x\to 0^+} \sin x \cdot \ln \dfrac{1}{x} = 0$

g.– $\lim\limits_{x\to +\infty} \left(\dfrac{x}{\ln x}\right)^{1/x} = 1$ h.– $\lim\limits_{x\to +\infty} \left(\sqrt{x+1} - \sqrt{x-1}\right) = 0$ i.– $\lim\limits_{x\to +\infty} \left(\dfrac{x}{x+1}\right)^x = e^{-1}$

j.– $\lim\limits_{x\to 0} x \cdot \sin \dfrac{1}{x} = 0$ k.– $\lim\limits_{x\to 0} x^{\sin x} = 1$ l.– $\lim\limits_{x\to +\infty} \left(\dfrac{x^2+1}{x^2}\right)^{x^2+1} = e$

5.– Hallar las asíntotas de las siguientes funciones:

a.– $y = \dfrac{1}{x+2}$ b.– $y = 2^x$ c.– $y = \dfrac{-x^2}{x+2}$

d.– $y = \dfrac{x^3}{x^2-1}$ e.– $y = \dfrac{x}{\ln x}$

Solución

a.–	Asíntota vertical: $x = -2$	Asíntota horizontal: $y = 0$
b.–	Asíntota horizontal: $y = 0$	
c.–	Asíntota vertical: $x = -2$	Asíntota oblicua: $y = -x + 2$
d.–	Asíntotas verticales: $x = \pm 1$	Asíntota oblicua: $y = x$
e.–	Asíntota vertical: $x = 1$	