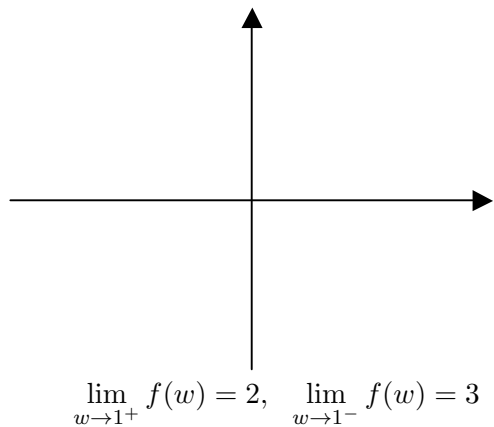
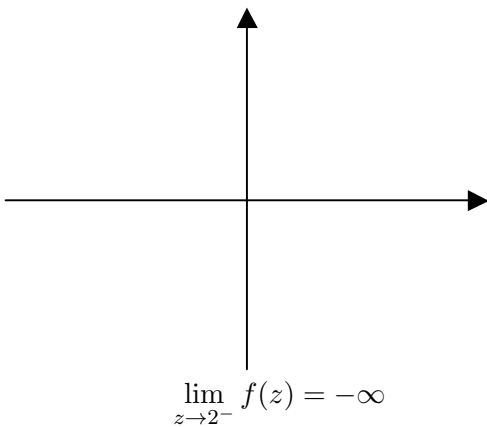
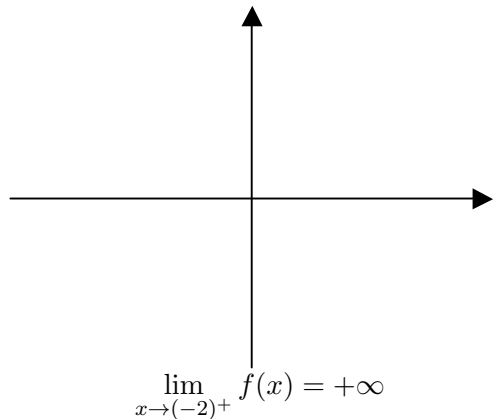
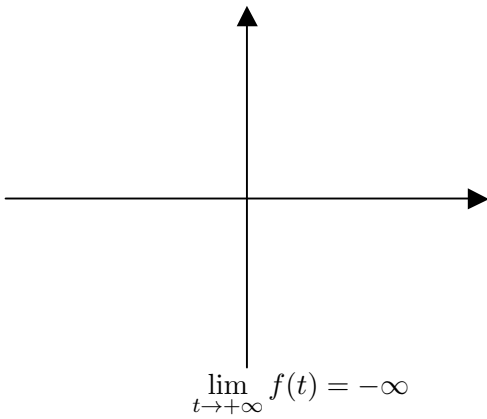
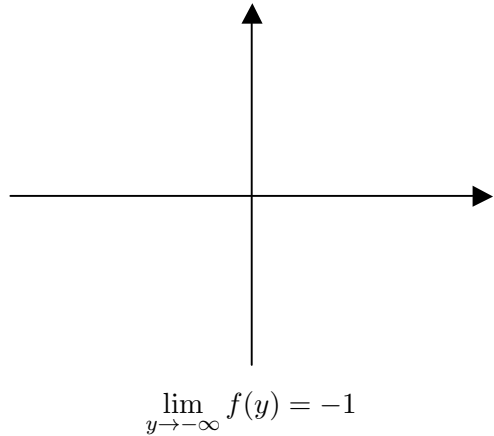
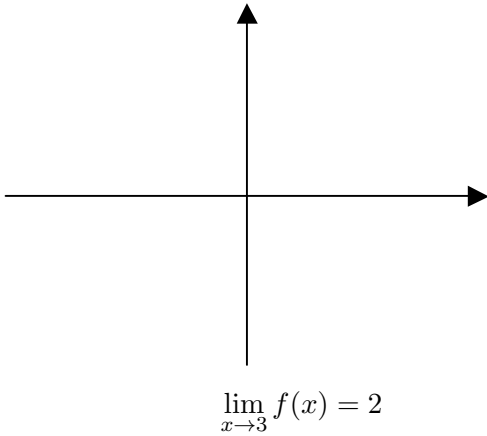
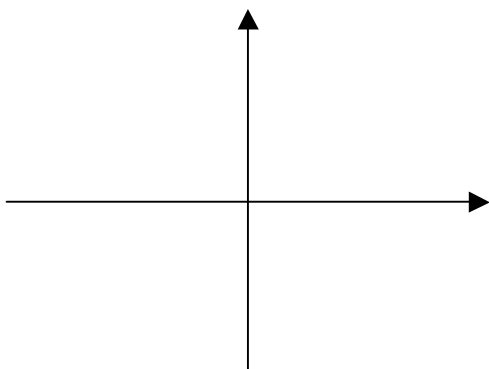


Corsi di Laurea in Tecniche di Radiologia Medica
per Immagini e Radioterapia
A.A. 2010/2011
Analisi Matematica
Esercizi del 25 ottobre 2010

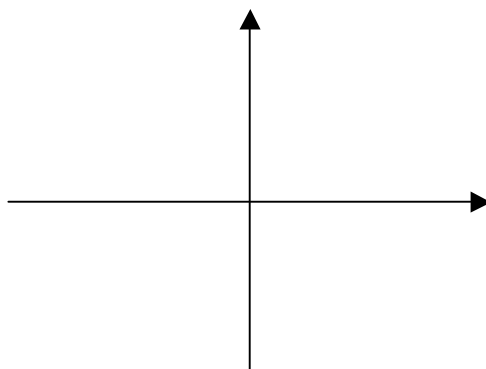
Esercizio 1. Rappresentare graficamente le informazioni fornite dai seguenti limiti:



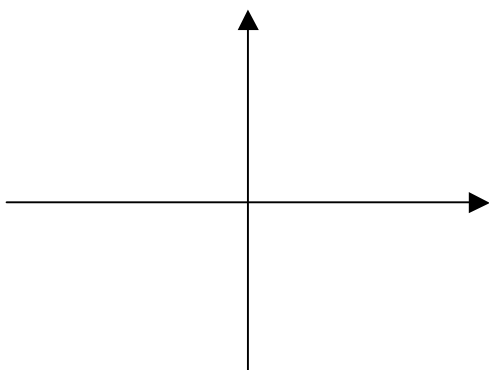
Esercizio 2. Rappresentare il grafico di una funzione g che verifichi contemporaneamente le seguenti proprietà:



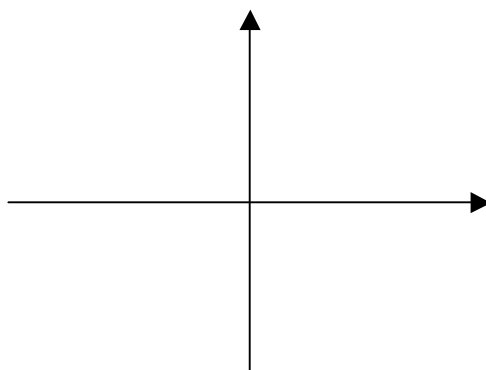
$$\begin{aligned} \lim_{x \rightarrow -\infty} g(x) &= 2 & \lim_{x \rightarrow -2^-} g(x) &= +\infty \\ \lim_{x \rightarrow 2^+} g(x) &= -\infty & \lim_{x \rightarrow +\infty} g(x) &= +\infty \end{aligned}$$



$$\begin{aligned} \lim_{x \rightarrow -\infty} g(x) &= +\infty & \lim_{x \rightarrow 0^-} g(x) &= -1 \\ \lim_{x \rightarrow 0^+} g(x) &= 2 & \lim_{x \rightarrow +\infty} g(x) &= -\infty \end{aligned}$$



$$\begin{aligned} \lim_{x \rightarrow -\infty} g(x) &= +\infty & \lim_{x \rightarrow 0^-} g(x) &= 1 \\ \lim_{x \rightarrow 0^+} g(x) &= +\infty & \lim_{x \rightarrow +\infty} g(x) &= -2 \end{aligned}$$



$$\begin{aligned} \lim_{x \rightarrow -\infty} g(x) &= -3 & \lim_{x \rightarrow -1^-} g(x) &= 2 \\ \lim_{x \rightarrow -1^+} g(x) &= +\infty & \lim_{x \rightarrow +\infty} g(x) &= -\infty \end{aligned}$$

Esercizio 3. Calcolare il valore dei seguenti limiti (di funzioni continue):

$$\begin{aligned} \lim_{z \rightarrow -1} (z^3 + 3z - 5), & \quad \lim_{x \rightarrow 0} \frac{5 - \operatorname{sen} x}{\sqrt{x+5}}, & \quad \lim_{w \rightarrow 4} \sqrt{\frac{w+3}{w-3}}, \\ \lim_{x \rightarrow 2} \frac{x - 3x^2 + 1}{x^2 - 3x + 5}, & \quad \lim_{y \rightarrow 1} (3^{2y+1} - 5 \operatorname{arctg} y), & \quad \lim_{y \rightarrow -1} \frac{4|y-3| + \sqrt{5+y}}{y + \ln(2+y)}, \\ \lim_{t \rightarrow \pi} \frac{t - 3 \operatorname{sen} t}{2 \cos t + 1}, & \quad \lim_{x \rightarrow 2} \frac{\operatorname{arcsen}(1/x) - \operatorname{arccos}(x/2)}{x^2 - x}, & \quad \lim_{w \rightarrow 2} \frac{\operatorname{sen}(\pi \cos(\pi w))}{3w - \operatorname{arctg}(w-2)}. \end{aligned}$$

Esercizio 4. Calcolare il valore dei seguenti limiti (forme non indeterminate):

$$\begin{aligned} \lim_{w \rightarrow +\infty} (e^w + w^7), & \quad \lim_{x \rightarrow -\infty} \left(\frac{4}{x^2} - 3^x \right), & \quad \lim_{t \rightarrow +\infty} 5^t \ln(t^2 + t), \\ \lim_{t \rightarrow 0^+} 5^t \ln(t^2 + t), & \quad \lim_{y \rightarrow +\infty} (y^3 2^{3y+1}), & \quad \lim_{x \rightarrow +\infty} \frac{\operatorname{arctg} x}{x^2 + 1}. \end{aligned}$$

Esercizio 5. Calcolare ove possibile il valore dei seguenti limiti (forma $\frac{L}{0}$), calcolando eventualmente i relativi limiti destro e sinistro:

$$\lim_{x \rightarrow 0} \frac{2x-3}{x^2}, \quad \lim_{t \rightarrow 1} \frac{t^2+4}{t-1}, \quad \lim_{y \rightarrow -2} \frac{2y^2-3y-4}{(y+2)^2},$$

$$\lim_{z \rightarrow 1} \frac{5z-1}{\ln z}, \quad \lim_{w \rightarrow \pi} \frac{3-2\cos w}{\sin w}, \quad \lim_{x \rightarrow 1} \frac{1+3x}{x^2-3x+2}.$$

Esercizio 6. Calcolare il valore dei seguenti limiti (polinomi, funzioni razionali):

$$\lim_{t \rightarrow +\infty} (3t^2 - 12t + 5), \quad \lim_{y \rightarrow +\infty} (3 + y^2 - 4y^2), \quad \lim_{x \rightarrow -\infty} (7x^2 - x^3 + 2x - 1),$$

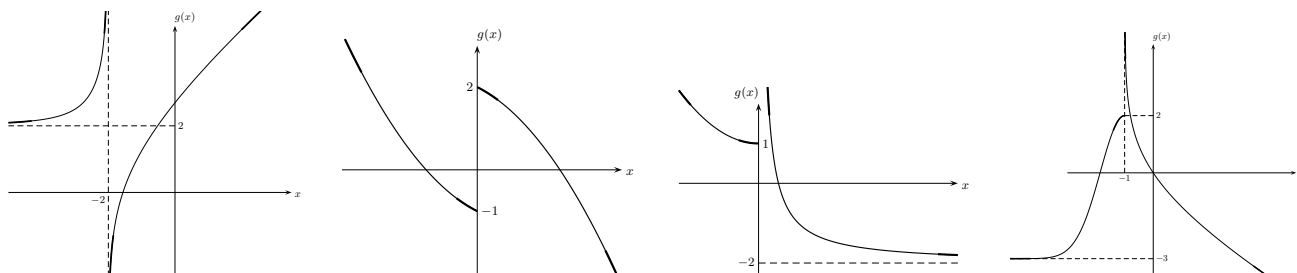
$$\lim_{x \rightarrow +\infty} (5x - 9 - 10x^3), \quad \lim_{y \rightarrow +\infty} (y^{15} - y^{21} + 3y - 1), \quad \lim_{z \rightarrow -\infty} (4z^3 + z^2z^2 + 1),$$

$$\lim_{x \rightarrow +\infty} \frac{7x^2 + x - 1}{x^3 + 1}, \quad \lim_{z \rightarrow -\infty} \frac{2z^3 + z - 5}{3z^2 - z + 2}, \quad \lim_{x \rightarrow +\infty} \frac{3x - x^2 + 1}{3x^2 - 2x + 2},$$

$$\lim_{w \rightarrow -\infty} \frac{4w^3 + w^2 - 2}{3w^3 - 5w}, \quad \lim_{s \rightarrow +\infty} \frac{4 + 5s}{3s^2 + 1}, \quad \lim_{x \rightarrow +\infty} \frac{4x^3 - 5}{x^2 + 2x - 1},$$

$$\lim_{x \rightarrow -\infty} \frac{4x^7 - 5x + 1}{1 - x^3 + 8x^2}, \quad \lim_{y \rightarrow -\infty} \frac{4y^4 + y^3 - 9}{12y^4 + y^5 + 2}, \quad \lim_{x \rightarrow +\infty} \frac{7x - 2x^3 + 2}{5x^3 - 2x + x^2}.$$

Soluzioni di 2.: in neretto si evidenziano le informazioni date dai limiti. Il grafico della funzione è quindi completato a piacere (linea sottile), ad esempio:



Soluzioni di 3.: -9 ; $\sqrt{5}$; $\sqrt{7}$; -3 ; $9 - 5\pi/4$; -18 ; $-\pi$; $\pi/12$; 0 .

Soluzioni di 4.: $+\infty$; 0 ; $+\infty$; $-\infty$; $+\infty$; 0 .

Soluzioni di 5.: $-\infty$; $\lim_{x \rightarrow -\infty} sx = -\infty$, $\lim_{x \rightarrow +\infty} dx = +\infty$; $-\infty$; $\lim_{x \rightarrow -\infty} sx = -\infty$, $\lim_{x \rightarrow +\infty} dx = +\infty$; $\lim_{x \rightarrow -\infty} sx = +\infty$, $\lim_{x \rightarrow +\infty} dx = -\infty$; $\lim_{x \rightarrow -\infty} sx = +\infty$, $\lim_{x \rightarrow +\infty} dx = -\infty$.

Soluzioni di 6.: $+\infty$; $-\infty$; $+\infty$; $-\infty$; $-\infty$; $+\infty$; 0 ; $+\infty$; $-1/3$; $4/3$; 0 ; $+\infty$; $-\infty$; 0 ; $-2/5$.