

Studiare i seguenti limiti:

$$1. \lim_{(x,y) \rightarrow (0,0)} \frac{y}{x^2};$$

$$2. \lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + y^4}{x^4 + y^2};$$

$$3. \lim_{(x,y) \rightarrow (0,0)} \frac{xy(2y^2 + x^3)}{x^4 + y^2};$$

$$4. \lim_{(x,y) \rightarrow (0,0)} \frac{1 - \cos(xy)}{\log(1 + x^2 + y^2)};$$

$$5. \lim_{(x,y) \rightarrow (0,0)} \frac{x^3 - y^5}{(x^2 + y^2)^2} \sin xy;$$

$$6. \lim_{(x,y) \rightarrow (0,0)} \frac{e^{\sqrt{x^2 + y^2}} - 2}{x^2 + y^2};$$

$$7. \lim_{(x,y) \rightarrow (0,0)} \frac{x^3 + y^5}{x^2 + y^5};$$

$$8. \lim_{(x,y) \rightarrow (1,1)} \frac{\log(x^2 + y^2 + 2xy - 3)}{\sin(x + y - 2)};$$

$$9. \lim_{(x,y) \rightarrow (0,0)} x e^{-\frac{y}{x}};$$

$$10. \lim_{(x,y) \rightarrow (0,0)} \frac{|y|^\alpha \cos x}{\sqrt{x^2 + y^2}} \quad \text{al variare di } \alpha \in \mathbf{R};$$

$$11. \lim_{(x,y) \rightarrow (1,0)} \frac{y^2 \log x}{(x - 1)^2 + y^2};$$

$$12. \lim_{(x,y) \rightarrow (x_o, y_o)} \frac{(x - x_o)(y - y_o)}{(x - x_o)^2 + (y - y_o)^2};$$

$$13. \lim_{(x,y) \rightarrow (x_o, y_o)} \frac{|x - x_o|^\alpha |y - y_o|^\beta}{|x - x_o|^\gamma + |y - y_o|^\delta} \quad \text{al variare di } \alpha, \beta, \gamma, \delta \in \mathbf{R};$$

$$14. \lim_{(x,y) \rightarrow (x_o, y_o)} \frac{(x - x_o)(y - y_o) \log(x - x_o + 1)}{(x - x_o)^2 + (y - y_o)^2};$$

$$15. \lim_{(x,y) \rightarrow (1,2)} \frac{xy - 2x - y + 2}{x^2 - 2x + y^2 - 4y + 5};$$

$$16. \lim_{(x,y) \rightarrow (0,0)} \frac{\sin(x^3 + xy^2)}{\log(1 + x^6 + x^2y^4 + 2x^4y^2)};$$

17. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{y}{x^2}$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid x^2 \leq y \leq 2x^2\}$;
18. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{y}{x^2} \log \left(\frac{1+x+y}{x+y} \right)$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid x^2 \leq y \leq 2x^2\}$;
19. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{y}{x^2} \left[(x+y) \log \left(\frac{1+x+y}{x+y} - 1 \right) \right]$
dove $A = \{(x,y) \in \mathbf{R}^2 \mid x^2 \leq y \leq 2x^2\}$;
20. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ x \in A}} \frac{y e^{-(x^2+y^2)}}{x - x^3 - xy^2}$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid |y| \leq \frac{1}{x}, x \geq 1\}$;
21. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \log(1+y)^x$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid |y| \leq \frac{1}{x}, x \geq 1\}$;
22. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{y}{x^2} e^{-\frac{1}{x+y}}$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid x^2 \leq y \leq 2x^2\}$;
23. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} (1+x) \operatorname{sen} \frac{1}{y}$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid y \leq \sqrt{1+x^2}, x \geq \sqrt{1+y^2}, x \geq 0, y \geq 0\}$;
24. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} x^3 y e^{-xy}$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid x \geq 0, x \leq y \leq 2x\}$;
25. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \left(1 + \frac{1}{x} \right)^y$ dove $A = \{(x,y) \in \mathbf{R}^2 \mid x \geq 1\}$;
26. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{y}{x}$ dove $A = \left\{ (x,y) \in \mathbf{R}^2 \mid -\frac{1}{1+x^2} \leq y \leq \frac{1}{1+x^2} \right\}$;
27. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ x \in A}} |y|^\alpha |x|^\beta$ dove $A = \left\{ (x,y) \in \mathbf{R}^2 \mid -\frac{1}{1+x^2} \leq y \leq \frac{1}{1+x^2} \right\}$
al variare di $\alpha, \beta \in \mathbf{R}$;
28. $\lim_{\substack{|(x,y)| \rightarrow +\infty \\ (x,y) \in A}} \frac{\operatorname{sen} y \log |y|}{xy}$ dove $A = \left\{ (x,y) \in \mathbf{R}^2 \mid -\frac{1}{1+x^2} \leq y \leq \frac{1}{1+x^2} \right\}$;
29. $\lim_{|(x,y,z)| \rightarrow +\infty} (x^4 + y^2 + z^2 - x + 3y - z)$;
30. $\lim_{|(x,y,z)| \rightarrow +\infty} (x^4 + y^2 + z^2 - x^3 + xyz - x + 4)$;
31. $\lim_{|(x,y,z)| \rightarrow +\infty} (x^3 + y^2 + z^3 - xy)$;
32. $\lim_{|(x,y,z)| \rightarrow +\infty} (x^4 + y^4 + z^4 - x^3 - y^3 - z^3 + x^2 y z^2)$.