

LIMITI

A) Di funzioni elementari

$$1. \lim_{x \rightarrow +\infty} \sqrt[n]{x} = +\infty$$

$$2. \lim_{x \rightarrow +\infty} x^a = +\infty \quad \text{se } a > 0$$

$$3. \lim_{x \rightarrow \pm\infty} \frac{1}{x^a} = 0 \quad \text{se } a > 0$$

$$4. \lim_{x \rightarrow 0} \frac{1}{x^a} = \infty \quad \text{se } a > 0$$

$$5. \lim_{x \rightarrow -\infty} x^a = 0 \quad \text{se } a > 0$$

$$6. \lim_{x \rightarrow -\infty} x^a = +\infty \quad \text{se } 0 < a < 1$$

$$7. \lim_{x \rightarrow +\infty} x^a = +\infty \quad \text{se } a > 1$$

$$8. \lim_{x \rightarrow +\infty} x^a = 0 \quad \text{se } 0 < a < 1$$

$$9. \lim_{x \rightarrow +\infty} \log_a x = +\infty \quad \text{se } a > 1$$

$$10. \lim_{x \rightarrow +\infty} \log_a x = -\infty \quad \text{se } 0 < a < 1$$

$$11. \lim_{x \rightarrow 0^+} \log_a x = -\infty \quad \text{se } a > 1$$

$$12. \lim_{x \rightarrow 0^+} \log_a x = +\infty \quad \text{se } 0 < a < 1$$

B) Notevoli

$$13. \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x = e$$

$$14. \lim_{x \rightarrow \infty} \left(1 + \frac{\alpha}{x}\right)^x = e^\alpha$$

$$15. \lim_{x \rightarrow 0} \left(1 + \frac{1}{x}\right)^{\frac{1}{x}} = e$$

$$16. \lim_{x \rightarrow 0} \frac{\ln(1+x)}{x} = 1$$

$$17. \lim_{x \rightarrow 0} \frac{\log_a(1+x)}{x} = \log_a e = \frac{1}{\ln(a)}; a \neq 1$$

$$18. \lim_{x \rightarrow 0} \frac{\ln(1+\alpha x)}{x} = \alpha$$

$$19. \lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$$

$$20. \lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln(a) = \frac{1}{\log_a e}$$

$$21. \lim_{x \rightarrow 0} \frac{(1+x)^k - 1}{x} = k; k \in \mathbb{R}$$

$$22. \lim_{x \rightarrow +\infty} \frac{e^x}{x^\beta} = +\infty$$

$$23. \lim_{x \rightarrow +\infty} \frac{(\ln x)^\alpha}{x^\beta} = 0$$

$$24. \lim_{x \rightarrow +\infty} x^\beta \cdot (\ln x)^\alpha = 0; \forall \alpha, \beta \in \mathbb{R}, \beta > 0$$

$$25. \lim_{x \rightarrow 0} \sin x = 0$$

$$26. \lim_{x \rightarrow 0} \cos x = 1$$

$$27. \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$28. \lim_{x \rightarrow 0} \frac{(\sin x)^n}{x^n} = 1$$

$$29. \lim_{x \rightarrow 0} \frac{\sin ax}{ax} = 1, a \neq 0$$

$$30. \lim_{x \rightarrow 0} \frac{\sin ax}{x} = a$$

$$31. \lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$$

$$32. \lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = 0$$

$$33. \lim_{x \rightarrow 0} \frac{1 - (\cos x)^2}{x^2} = \frac{1}{2}$$

$$34. \lim_{x \rightarrow 0} x \sin \frac{1}{x} \quad (\text{poichè } \left| x \sin \frac{1}{x} \right| < |x|)$$

$$35. \lim_{x \rightarrow 0} x^2 \left(\sin \frac{\pi}{x} \right)^2 = 0$$

$$(\text{poichè } 0 \leq x^2 \left(\sin \frac{\pi}{x} \right)^2 \leq x^2)$$