

Applicando il primo teorema di De L'Hospital calcolare i seguenti limiti che si

presentano nella forma indeterminata $\frac{0}{0}$

<p>174 $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$</p> <p>175 $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$</p> <p>176 $\lim_{x \rightarrow 2} \frac{x + 2}{\sqrt{x^2 + 2x}}$</p> <p>177 $\lim_{x \rightarrow 1} \frac{\ln(2 - x)}{2 - \sqrt{x^2 + 3}}$</p> <p>178 $\lim_{x \rightarrow 0} \frac{x + \sin x}{x - \sqrt{x}}$</p> <p>179 $\lim_{x \rightarrow 0} \frac{x - \sin x}{x + \sin x}$</p> <p>$\frac{3}{2}, \frac{1}{4}, 0, 2, 0, 0$</p>	<p>180 $\lim_{x \rightarrow 0^+} \frac{1 - e^x}{x^2}$</p> <p>181 $\lim_{x \rightarrow \frac{\pi}{2}} \frac{x \cos x}{x - \frac{\pi}{2}}$</p> <p>182 $\lim_{x \rightarrow +\infty} \frac{\sin \frac{1}{x}}{1 - e^{\frac{1}{x}}}$</p> <p>183 $\lim_{x \rightarrow 0} \frac{2x^2 - 3x^3}{(e^x - 1)^2}$</p> <p>184 $\lim_{x \rightarrow 5} \frac{2 \ln x - \ln 25}{x^2 - 25}$</p> <p>185 $\lim_{x \rightarrow 3} \frac{2^x - 8}{x^2 - 9}$</p> <p>$-\infty, -\frac{\pi}{2}, -1, 2, \frac{1}{25}, \frac{4}{3} \ln 2$</p>	<p>186 $\lim_{x \rightarrow 1} \frac{x \cdot 2^x - 2x}{\ln x}$</p> <p>187 $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$</p> <p>188 $\lim_{x \rightarrow 0} \frac{x - 2 \tan x}{x}$</p> <p>189 $\lim_{x \rightarrow 0} \frac{3(e^x - 1)}{\ln(x + 1)}$</p> <p>190 $\lim_{x \rightarrow 1} \frac{x^2 - 1}{e^x \ln x}$</p> <p>191 $\lim_{x \rightarrow 3} \frac{\sqrt{x} - \sqrt{3}}{x^2 - 3x}$</p> <p>$2 \ln 2, \frac{1}{2}, -1, 3, \frac{2}{e}, \frac{\sqrt{3}}{18}$</p>
<p>192 $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{\tan x - 1}$</p> <p>193 $\lim_{x \rightarrow 0} \frac{\sin x - x}{\cos x - 1}$</p> <p>194 $\lim_{x \rightarrow 0} \frac{(2x - 1)^5 + 1}{x}$</p> <p>195 $\lim_{x \rightarrow 0} \frac{3x^2 - 4x + \sin 2x}{x^2 - 1 + \cos x}$</p> <p>196 $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x^2 - x - 2}$</p> <p>197 $\lim_{x \rightarrow +\infty} \frac{e^{\frac{1}{x}} - 1}{\pi - 2 \arctan x}$</p> <p>$\frac{\sqrt{2}}{2}, 0, 10, \infty, \frac{\sqrt{2}}{12}, \frac{1}{2}$</p>	<p>198 $\lim_{x \rightarrow \sqrt{2}} \frac{x^3 - 2\sqrt{2}x^2 + 2x}{x^2 - (\sqrt{2} + \sqrt{6})x + 2\sqrt{3}}$</p> <p>199 $\lim_{x \rightarrow 2^+} \frac{\sqrt{x-2} + \sqrt{x-1} - 1}{x^2 - 4}$</p> <p>200 $\lim_{x \rightarrow 6} \frac{2 - \sqrt{x-2}}{x^2 - 5x - 6}$</p> <p>201 $\lim_{x \rightarrow 0} \frac{e^{2x} - 5x - 1}{\sin^2 x - x}$</p> <p>$0, +\infty, -\frac{1}{28}, 3$</p>	<p>202 $\lim_{x \rightarrow 0} \frac{\sin 3x - \sin \frac{x}{2}}{x^2 - 3x}$</p> <p>203 $\lim_{x \rightarrow 1} \frac{\ln^2 x - 3 \ln x}{\sin(x - 1)}$</p> <p>204 $\lim_{x \rightarrow 0} \sqrt{\frac{1 - \cos x}{2x}}$</p> <p>$-\frac{5}{6}, -3, 0$</p>
<p>572. $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$ R. 0 </p> <p>573. $\lim_{x \rightarrow 0} \frac{\sqrt{1 - \cos x}}{x}$ R. $\frac{\sqrt{2}}{2}$</p> <p>574. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x}{1 - \cos x}$ R. ∞</p>	<p>575. $\lim_{x \rightarrow 0} \frac{\operatorname{sen} x - x \cos x}{x \cos x}$ R. 0</p> <p>576. $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{x \operatorname{sen} x \cos x}$ R. 1</p> <p>577. $\lim_{x \rightarrow 0} \frac{x \operatorname{sen} x}{1 + \cos x - 2 \cos^2 x}$ R. $\frac{2}{3}$</p>	

<p>578. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\text{sen } x + \cos 2x}{1 + \text{sen}^2 2x + \cos 2x}$ R. $\frac{1}{4}$</p> <p>579. $\lim_{x \rightarrow a} \frac{\text{tg}(x-a)}{\text{sen}^2 x - \text{sen}^2 a}$ R. $\frac{1}{\text{sen } 2a}$</p> <p>580. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\cos 2x}{\cos x - \cos \frac{\pi}{4}}$ R. $2\sqrt{2}$</p>	<p>581. $\lim_{x \rightarrow \pi} \frac{(x-\pi)^2}{3 \left(\text{sen}^2 \frac{x}{2} + \cos x \right)}$ R. $\frac{4}{3}$</p> <p>582. $\lim_{x \rightarrow 0} \frac{\text{tg } x - \text{sen } x}{x^3}$ R. $\frac{1}{2}$</p> <p>583. $\lim_{x \rightarrow 0} \frac{1 + 2 \cos^3 x - 3 \sqrt{\cos 2x}}{\text{sen}^4 x}$ R. $\frac{9}{4}$</p>
<p>584. $\lim_{x \rightarrow 0} \frac{x + \text{arc tg } x}{\text{arc sen } x}$ R. 2</p> <p>585. $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} - 2 \text{sen } x}{x - \text{sen } x}$ R. 4</p> <p>586. $\lim_{x \rightarrow 0} \frac{\log(1+2x)}{x}$ R. 2</p> <p>587. $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$ R. 1</p>	<p>573. $\lim_{x \rightarrow 0} \frac{\sqrt{1-\cos x}}{x}$ R. $\frac{\sqrt{2}}{2}$</p> <p>574. $\lim_{x \rightarrow 0} \frac{\text{tg } x}{1 - \cos x}$ R. ∞</p> <p>575. $\lim_{x \rightarrow 0} \frac{\text{sen } x - x \cos x}{x \cos x}$ R. 0</p> <p>576. $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{x \text{sen } x \cos x}$ R. 1</p>
<p>577. $\lim_{x \rightarrow 0} \frac{x \text{sen } x}{1 + \cos x - 2 \cos^2 x}$ R. $\frac{2}{3}$</p> <p>578. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\text{sen } x + \cos 2x}{1 + \text{sen}^2 2x + \cos 2x}$ R. $\frac{1}{4}$</p> <p>579. $\lim_{x \rightarrow a} \frac{\text{tg}(x-a)}{\text{sen}^2 x - \text{sen}^2 a}$ R. $\frac{1}{\text{sen } 2a}$</p> <p>580. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\cos 2x}{\cos x - \cos \frac{\pi}{4}}$ R. $2\sqrt{2}$</p>	<p>581. $\lim_{x \rightarrow \pi} \frac{(x-\pi)^2}{3 \left(\text{sen}^2 \frac{x}{2} + \cos x \right)}$ R. $\frac{4}{3}$</p> <p>582. $\lim_{x \rightarrow 0} \frac{\text{tg } x - \text{sen } x}{x^3}$ R. $\frac{1}{2}$</p> <p>583. $\lim_{x \rightarrow 0} \frac{1 + 2 \cos^3 x - 3 \sqrt{\cos 2x}}{\text{sen}^4 x}$ R. $\frac{9}{4}$</p> <p>584. $\lim_{x \rightarrow 0} \frac{x + \text{arc tg } x}{\text{arc sen } x}$ R. 2</p>
<p>585. $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} - 2 \text{sen } x}{x - \text{sen } x}$ R. 4</p> <p>586. $\lim_{x \rightarrow 0} \frac{\log(1+2x)}{x}$ R. 2</p> <p>587. $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$ R. 1</p>	<p>588. $\lim_{x \rightarrow 0} \frac{x^2 - \text{sen}^2 x}{e^x - e^{-x} - 2 \text{sen } x}$ R. 0</p> <p>590. $\lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{1 - \cos x}$ R. 2</p> <p>591. $\lim_{x \rightarrow 0} \frac{e^{\text{sen } x} - 1}{\text{tg } x}$ R. 1</p>

Applicando il primo teorema di De L'Hospital calcolare i seguenti limiti che si

presentano nella forma indeterminata $\frac{\infty}{\infty}$

205 $\lim_{x \rightarrow +\infty} \frac{x^3 - 2x}{\ln x} = +\infty$	206 $\lim_{x \rightarrow 0^+} \frac{e^{\frac{1}{x}} - 1}{\ln x} = -\infty$	207 $\lim_{x \rightarrow \infty} \frac{e^x + x}{e^x - 1} = 1$
208 $\lim_{x \rightarrow (\frac{\pi}{2})^-} \frac{\ln(\cos x)}{\tan x} = 0$	209 $\lim_{x \rightarrow +\infty} \frac{\sqrt[3]{x} + 1}{\ln(1 + x^2)} = +\infty$	210 $\lim_{x \rightarrow -\infty} \frac{\ln(1 - x)}{x} = 0$
211 $\lim_{x \rightarrow +\infty} \frac{x - \sqrt{x-1}}{x + \sqrt{x+1}} = 1$	212 $\lim_{x \rightarrow +\infty} \frac{e^{x^2}}{e^x + x^2} = +\infty$	213 $\lim_{x \rightarrow +\infty} \frac{x^3 + 2x^2 + 1}{e^{2x}} = 0$
214 $\lim_{x \rightarrow \infty} \frac{\ln(1 + x^2)}{x} = 0$	215 $\lim_{x \rightarrow -1^+} \frac{e^{\frac{1}{x+1}}}{\ln(1+x)} = -\infty$	216 $\lim_{x \rightarrow +\infty} \frac{x^2 - 3 \sin x}{2x^3 + 3 \cos x} = 0$
217 $\lim_{x \rightarrow 0^+} \frac{\ln x}{e^{\frac{1}{x}}} = 0$	218 $\lim_{x \rightarrow 2^+} \frac{\tan(x \cdot \frac{\pi}{4})}{\ln(x-2) + x^2} = +\infty$	219 $\lim_{x \rightarrow +\infty} \frac{\ln^2 x - \ln x}{x^2 - x} = 0$
220 $\lim_{x \rightarrow +\infty} \frac{e^x - x}{x^3} = +\infty$	221 $\lim_{x \rightarrow +\infty} \frac{3x^2 - 7\sqrt{x} + 1}{\sqrt{x-2} + x^3} = 0$	222 $\lim_{x \rightarrow (\frac{\pi}{2})^-} \frac{\ln(\tan x)}{\tan x} = 0$
223 $\lim_{x \rightarrow +\infty} \frac{e^x}{\ln x - x} = -\infty$	224 $\lim_{x \rightarrow +\infty} \frac{e^x}{x \ln x} = +\infty$	225 $\lim_{x \rightarrow +\infty} \frac{\sqrt{2x-3} + 5x}{\sqrt[3]{x^3-1}} = 5$
226 $\lim_{x \rightarrow 0^+} \frac{\ln x}{\cotan x} = 0$		
136 $\lim_{x \rightarrow +\infty} \frac{x + x^2}{e^x} = 0;$ 137 $\lim_{x \rightarrow -\infty} \frac{2^{-x}}{x^2} = +\infty;$ 138 $\lim_{x \rightarrow +\infty} \frac{3^x + x}{3^x - x} = 1;$ 139 $\lim_{x \rightarrow +\infty} \frac{(\lg x)^2}{\sqrt{x}} = 0;$	$\lim_{x \rightarrow +\infty} \frac{e^x}{\lg(x^4)} = +\infty;$ $\lim_{x \rightarrow 0^+} \frac{\lg \sen x}{1/x} = 0;$ $\lim_{x \rightarrow +\infty} \frac{x + 2 \lg x}{2x + \lg x} = \frac{1}{2};$ $\lim_{x \rightarrow 0^+} \frac{\cotang x}{\lg(x^3)} = -\infty;$	140 $\lim_{x \rightarrow (\pi/2)^+} \frac{\lg[x - (\pi/2)]}{\tang x} = 0;$ 141 $\lim_{x \rightarrow 3^+} \frac{\lg(x-3)}{(x-3)^{-1}} = 0;$ 142 $\lim_{x \rightarrow +\infty} \frac{2\sqrt{e^x}}{x^2} = +\infty;$ 143 $\lim_{x \rightarrow \pi/2} \frac{x^2 \tang x}{1 + 2 \tang x} = \frac{\pi^2}{8};$
$\lim_{x \rightarrow +\infty} \frac{\lg(5 + 2x)}{x} = 0;$ $\lim_{x \rightarrow 0^+} \frac{\lg x}{e^{1/x}} = 0;$ $\lim_{x \rightarrow \pi} \frac{\lg(x - \pi)}{\cotang 2x} = 0;$ $\lim_{x \rightarrow 0^+} \frac{\lg x}{x^{-5}} = 0.$		

Applicando i teoremi di De L'Hospital calcolare i seguenti limiti che si presentano nelle altre forme indeterminate

227 $\lim_{x \rightarrow 1^-} (x-1) \cdot \ln(1-x)$ 0	228 $\lim_{x \rightarrow +\infty} e^{-3x+2} \cdot (x^4 - 5x + 1)$ 0	229 $\lim_{x \rightarrow -\infty} e^{4x-1} \cdot (x^3 + x - 2)$ 0
230 $\lim_{x \rightarrow \frac{\pi}{2}} \left(x - \frac{\pi}{2}\right) \cdot \tan x$ -1	231 $\lim_{x \rightarrow -\infty} x^5 \cdot e^x$ 0	232 $\lim_{x \rightarrow 0^+} (x + \sin x) \cdot \ln x$ 0
233 $\lim_{x \rightarrow +\infty} (\ln x - x^2)$ $-\infty$	234 $\lim_{x \rightarrow 0^+} \left(\ln x + \frac{1}{x^3}\right)$ $+\infty$	235 $\lim_{x \rightarrow +\infty} (e^x - x)$ $+\infty$
237 $\lim_{x \rightarrow +\infty} \frac{e^{2x}}{e^x - x^2}$ $+\infty$	238 $\lim_{x \rightarrow 0} x^{\sin x}$ 1	239 $\lim_{x \rightarrow +\infty} \left(\frac{1}{x}\right)^{\frac{2}{x}}$ 1
240 $\lim_{x \rightarrow 0^+} (x^2 + 2x)^{2x}$ 1	241 $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{\pi}{2} - x\right)^{\cos x}$ 1	242 $\lim_{x \rightarrow 0} (1 - e^x)^x$ 1
243 $\lim_{x \rightarrow 0} (\tan x)^x$ 1	244 $\lim_{x \rightarrow 0^+} (1+x)^{\ln x}$ 1	
245 $\lim_{x \rightarrow +\infty} \left(1 + \frac{2}{x}\right)^{x^2}$	250 $\lim_{x \rightarrow +\infty} (x^3 + x)e^{-x}$	255 $\lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{x^2}$
246 $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$	251 $\lim_{x \rightarrow 1^+} \left(\frac{1}{x-1}\right)^{\sqrt{x}-1}$	256 $\lim_{x \rightarrow 0} \frac{1}{5}(3x - 3 \sin x)x^{-3}$
247 $\lim_{x \rightarrow +\infty} \left(\frac{x^2+1}{x^2}\right)^x$	252 $\lim_{x \rightarrow 0^+} \left(\frac{1}{x}\right)^{\sin x}$	257 $\lim_{x \rightarrow 0} (1 + \sin x)^{\cotan x}$
248 $\lim_{x \rightarrow 0} (\cos x)^{\frac{1}{x}}$	253 $\lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} (\tan x)^{\cos x}$	258 $\lim_{x \rightarrow 0} (x \cdot \cotan x)^{\frac{1}{\sin x}}$
249 $\lim_{x \rightarrow +\infty} (1 + 2x)^{\frac{1}{x}}$ $+\infty, 1, 1, 1, 1$	254 $\lim_{x \rightarrow 0} \left(\frac{1}{x}\right)^{\sqrt{x}}$ $0, 1, 1, 1, 1$	259 $\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{x - \sin x}$ $1, \frac{1}{10}, e, 1, \infty$
260 $\lim_{x \rightarrow +\infty} \left(\frac{\sqrt{1+x}}{\ln x}\right) \cdot \frac{1}{e^x}$	263 $\lim_{x \rightarrow +\infty} \left(\frac{1}{x}\right)^{\frac{1}{e^{2x+1}}}$	265 $\lim_{x \rightarrow 0} \frac{\ln(x+1)}{1 - e^{x^2}}$
261 $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{1}{\cos x} - \tan x\right)$ $0, 0$	264 $\lim_{x \rightarrow e} \left(\frac{1}{\ln x} - 1\right)^{x-e}$ $1, 1$	266 $\lim_{x \rightarrow 0^+} \frac{\sqrt{1 - \ln x}}{e^{\frac{1}{x}}}$ $\infty, 0$
267 $\lim_{x \rightarrow 0} \sqrt[3]{1+x^4}$		
268 $\lim_{x \rightarrow 0} (1+x)^{\tan\left(\frac{\pi}{2}+x\right)}$ $1, \frac{1}{e}$		

Applicando i teoremi di De L'Hospital calcolare i seguenti limiti

23. $\lim_{x \rightarrow 0} \frac{1 - \cos x + 2x \operatorname{sen} x}{\operatorname{sen} x + x \cos x}$ R. 0	27. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\operatorname{sen} x - \cos x}{\operatorname{sen} 2x - 2 \cos^2 x}$ R. $\frac{\sqrt{2}}{2}$
24. $\lim_{x \rightarrow 0} \frac{\operatorname{sen} x}{\operatorname{sen} x + x \cos x}$ R. $\frac{1}{2}$	28. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\operatorname{ctg} x + \operatorname{cosec} x - 1}{\operatorname{ctg} x - \operatorname{cosec} x + 1}$ R. 1
25. $\lim_{x \rightarrow 0} \frac{\operatorname{sen} x}{\operatorname{sen} x + x \cos x - x^2 \operatorname{sen} x}$ R. $\frac{1}{2}$	29. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x - \operatorname{sen} x}{\operatorname{sen}^3 x}$ R. $\frac{1}{2}$
26. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\pi - 2x}{\cos x}$ R. 2	30. $\lim_{x \rightarrow 0} \frac{\operatorname{sen} x - x \cos x}{x^2 \operatorname{sen} x}$ R. $\frac{1}{3}$
31. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \operatorname{sen} x}{\operatorname{ctg} x}$ R. 0	35. $\lim_{x \rightarrow 0} \frac{x^2 - 2 + 2 \cos x}{x^2 - x^2 \cos x}$ R. $\frac{1}{6}$
32. $\lim_{x \rightarrow 0} \frac{1 + \operatorname{sen} x - \cos x}{1 + \operatorname{sen} 3x - \cos 3x}$ R. $\frac{1}{3}$	36. $\lim_{x \rightarrow 0} \frac{1 - \cos x \sqrt{\cos 2x}}{\operatorname{sen}^2 x}$ R. $\frac{3}{2}$
33. $\lim_{x \rightarrow 0} \frac{x - \operatorname{sen} x}{x^3}$ R. $\frac{1}{6}$	37. $\lim_{x \rightarrow 0} \frac{2 \operatorname{tg} x \cos^2 x}{\operatorname{tg} 2x \cos^2 2x}$ R. 1
34. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x - x}{x^3}$ R. $\frac{1}{3}$	38. $\lim_{x \rightarrow \frac{\pi}{6}} \frac{2 \operatorname{sen} x - \operatorname{sen} 3x}{\sqrt{3} \cos x - 3 \operatorname{sen} x}$ R. $-\frac{1}{2}$
39. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\sqrt{2 - \operatorname{sen} x} + \cos 2x}{\sqrt{1 + \cos^2 2x} - 2 \operatorname{sen} \frac{x}{2}}$ R. 0	43. $\lim_{x \rightarrow 0} \frac{\ln(x+1)}{2 - \ln[(x+e)^2]}$ R. $-\frac{e}{2}$
40. $\lim_{x \rightarrow 0} \frac{x - \operatorname{arcsen} x}{x^3}$ R. $-\frac{1}{6}$	44. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x}{\ln(1+x)}$ R. 1
41. $\lim_{x \rightarrow 0} \frac{x - \operatorname{arctg} x}{\operatorname{arcsen} x}$ R. 0	45. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\ln \operatorname{tg} x}{\operatorname{ctg} 2x}$ R. -1
42. $\lim_{x \rightarrow 0} \frac{\operatorname{arcsen} 2x - x}{2 \arccos x - \pi}$ R. $-\frac{1}{2}$	46. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\ln\left(2 - \frac{2x}{\pi}\right)}{\operatorname{ctg} x}$ R. $\frac{2}{\pi}$
47. $\lim_{x \rightarrow 0} \frac{1 - \cos x - \ln \cos x}{x^2}$ R. 1	49. $\lim_{x \rightarrow 1} \frac{2^{\ln x} - x}{\ln x}$ R. $\ln 2 - 1$
48. $\lim_{x \rightarrow 0} \frac{\ln(1+x^2)}{x \operatorname{sen} x}$ R. 1	50. $\lim_{x \rightarrow 0} \frac{a^x - x \ln a - \cos x}{\operatorname{sen}^2 x}$ R. $\frac{1}{2}(\ln^2 a + 1)$

51. $\lim_{x \rightarrow 0} \frac{e^x + \ln(1-x) - 1}{\operatorname{tg} x - x}$ R. $-\frac{1}{2}$	53. $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{x(e^{2x} + 1)}$ R. 1
52. $\lim_{x \rightarrow 0^+} \frac{e^x - \cos x}{\operatorname{sen}^2 x}$ R. $+\infty$	54. $\lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{1 - \cos x}$ R. 2
55. $\lim_{x \rightarrow 0} \frac{e^{2x} - 1 - 2x}{1 - \cos x}$ R. 4	59. $\lim_{x \rightarrow (\frac{\pi}{2})^-} \frac{\operatorname{tg} x}{\ln(\frac{\pi}{2} - x)}$ R. $-\infty$
56. $\lim_{x \rightarrow 0^+} x^3 \operatorname{ctg} x$ R. 0	60. $\lim_{x \rightarrow 0^+} \frac{\ln \operatorname{tg} 3x}{\ln \operatorname{tg} x}$ R. 1
57. $\lim_{x \rightarrow 0^+} \frac{\ln \operatorname{sen} x}{\operatorname{ctg} x}$ R. 0	61. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\operatorname{tg} x}{\operatorname{tg} 3x}$ R. 3
58. $\lim_{x \rightarrow (\frac{\pi}{2})^-} \frac{\ln(1 - \operatorname{sen} x)}{\ln \cos x}$ R. 2	62. $\lim_{x \rightarrow 0} \frac{x - \operatorname{sen} x}{x^2 \operatorname{sen} x}$ R. $\frac{1}{6}$
63. $\lim_{x \rightarrow +\infty} \frac{\ln x}{x^3}$ R. 0	68. $\lim_{x \rightarrow 0^+} (x \cdot \ln x)$ R. 0
64. $\lim_{x \rightarrow +\infty} \frac{e^x}{x^2}$ R. $+\infty$	69. $\lim_{x \rightarrow 0^+} (x^2 \cdot e^{\frac{1}{x}})$ R. $+\infty$
65. $\lim_{x \rightarrow +\infty} \frac{2x + \sqrt{x+1}}{3x + \sqrt{2x-1}}$ R. $\frac{2}{3}$	70. $\lim_{x \rightarrow (\frac{\pi}{2})^-} (\cos x \cdot \ln \cos x)$ R. 0
66. $\lim_{x \rightarrow +\infty} \frac{e^x + e^{2x}}{2e^x + x}$ R. $+\infty$	71. $\lim_{x \rightarrow 2^+} \left[(x-2) e^{\frac{1+x}{x-2}} \right]$ R. $+\infty$
67. $\lim_{x \rightarrow +\infty} \frac{\ln(x^2 + 3x)}{\ln x}$ R. 2	
72. $\lim_{x \rightarrow 0^+} (\operatorname{tg} x \cdot \ln x)$ R. 0	78. $\lim_{x \rightarrow 0} \frac{\operatorname{sen} x}{\cos x - e^x}$ -1
73. $\lim_{x \rightarrow \frac{\pi}{2}} [(1 - \operatorname{sen} x) \operatorname{tg} x]$ R. 0	79. $\lim_{x \rightarrow \pi} \frac{\ln \operatorname{tg} \frac{x}{4}}{x - \pi}$ $\frac{1}{2}$
74. $\lim_{x \rightarrow 0} [(1 - \cos x) \operatorname{ctg} x]$ R. 0	80. $\lim_{x \rightarrow 0} \left[\frac{1}{x} - \frac{1}{\ln(x+1)} \right]$ $-\frac{1}{2}$
75. $\lim_{x \rightarrow -1} \frac{x^2 - \ln^2(2+x) + 2x + 1}{(x+1)^2}$ R. 0	81. $\lim_{x \rightarrow 0} \left(\operatorname{cosec} x - \frac{1}{e^x - 1} \right)$ $\frac{1}{2}$
76. $\lim_{x \rightarrow -\infty} (x \cdot e^x)$ R. 0	82. $\lim_{x \rightarrow 0} \left(\frac{1}{x \cdot \cos x} - \operatorname{cotg} x \right)$ 0
77. $\lim_{x \rightarrow 4} \left[(4-x) \cdot \operatorname{tg} \frac{\pi}{8} x - 1 \right]$ $\frac{8-\pi}{\pi}$	83. $\lim_{x \rightarrow 0} \left[\frac{1}{x(e^x + 1)} - \frac{1}{2x} \right]$ $-\frac{1}{4}$

Stabilire se le seguenti funzioni verificano le ipotesi del teorema di Rolle ed in caso affermativo calcolare le ascisse dei punti di Rolle

- 4** $f(x) = x^3 - 3x$ in $[-2, 1]$ $[x = -1]$
- 5** $f(x) = x^3 - 7x$ in $[1, 2]$ $[x = \frac{\sqrt{21}}{3}]$
- 6** $f(x) = 1 + |x|$ in $[-1, 1]$ [non è derivabile in $x = 0$]
- 7** $f(x) = x^3 - 4x^2 - x + 5$ in $[-1, 1]$ $[x = \frac{4 - \sqrt{19}}{3}]$
- 8** $f(x) = x^3 - 3x^2 + 2x$ in $[0, 1]$ $[x = \frac{3 - \sqrt{3}}{3}]$
- 9** $f(x) = x^4 - 5x^3 - 8x^2 + 60x - 48$ in $[1, 4]$ $[x = 2, x = \frac{15}{4}]$
- 10** $f(x) = x^3 - 9x^2$ in $[0, 9]$ $[x = 6]$
- 12** $f(x) = x^4 - 10x^2 + 9$ in $[-3, 3]$ $[x = 0, x = \pm\sqrt{5}]$
- 13** $f(x) = \sqrt{1 - x^2}$ in $[-1, 1]$ $[x = 0]$
- 14** $f(x) = \frac{1}{x^2 + 1}$ in $[-1, 1]$ $[x = 0]$
- 15** $f(x) = \frac{x}{x^2 + 4}$ in $[1, 4]$ $[x = 2]$
- 16** $f(x) = \sqrt[5]{|x + 3|}$ in $[-6, 0]$ [non è derivabile in $x = -3$]
- 17** $f(x) = \frac{3x + 1}{3x^2}$ in $[-1, -\frac{1}{2}]$ $[x = -\frac{2}{3}]$
- 18** $f(x) = -\frac{9x^2 - 3x - 1}{x^2}$ in $[-1, -\frac{1}{2}]$ $[x = -\frac{2}{3}]$
- 19** $f(x) = \frac{3x - 5}{(x - 2)^2}$ in $[1, \frac{3}{2}]$ $x = \frac{4}{3}$
- 20** $f(x) = \frac{x^2 + x}{x^2 + 1}$ in $[-1, 0]$ $[x = 1 - \sqrt{2}]$
- 21** $f(x) = \frac{x^2 - 6x}{x^2 + 1}$ in $[-\frac{7}{5}, -1]$ $[x = \frac{-1 - \sqrt{37}}{6}]$
- 22** $f(x) = \frac{2x^2 - 1}{x + 1}$ in $[-\frac{7}{8}, 3]$ $[x = \frac{\sqrt{2}}{2} - 1]$
- 23** $f(x) = \sqrt[5]{|x|} + 3$ in $[-3, 3]$ [non è derivabile in $x = 0$]
- 24** $f(x) = \sqrt{x + 1} - 2\sqrt{x + 2}$ in $[-1, \frac{7}{9}]$ $[x = -\frac{2}{3}]$

25 $f(x) = \sqrt{1 - x^2 + x^4}$

26 $f(x) = x\sqrt{1+x}$

27 $f(x) = \begin{cases} -3x + 6 & x < 3 \\ x^2 - 6x + 11 & x \geq 3 \end{cases}$

in $[-\frac{1}{2}, \frac{1}{2}]$

in $[-1, 0]$

in $[2, 4]$

$[x = 0]$

$[x = -\frac{2}{3}]$

[non è continua in $x = 3$]

28 $f(x) = x^2 \cdot \sqrt{1 - x^2}$

in $[-1, 1]$ $[x = 0, x = \pm \frac{\sqrt{6}}{3}]$

29 $f(x) = x \cdot \sqrt{1 - x^2}$

in $[0, 1]$ $[x = \frac{\sqrt{2}}{2}]$

30 $f(x) = \frac{x^2 - 3x + 5}{x + 1}$

in $[0, 2]$ $[f(0) \neq f(2)]$

31 $f(x) = \sin x - \cos^2 x$

in $[0, \pi]$ $[x = \frac{\pi}{2}]$

32 $f(x) = \sin 2x$

in $[\frac{\pi}{2}, \pi]$ $[x = \frac{3}{4}\pi]$

33 $f(x) = \tan x(1 + \tan x)$

in $[-\frac{\pi}{4}, 0]$ $[x = -\arctan \frac{1}{2}]$

34 $f(x) = \ln(x^2 + 1)$

in $[-1, 1]$ $[x = 0]$

35 $f(x) = \frac{x^2 - 3x + 5}{x - 1}$

in $[0, 2]$ [non è definita in $x = 1$]

36 $f(x) = \ln^2 x - \ln x$

in $[1, e]$ $[x = \sqrt{e}]$

37 $f(x) = \frac{\ln x + 1}{\ln x}$

in $[e^{-\frac{1}{2}}, e]$ [non è definita in $x = 1$]

38 $f(x) = e^{-x} + e^x$

in $[-1, 1]$ $[x = 0]$

8. $y = \frac{x^3 + 2}{x}$

$[\sqrt{2} - 1; 2]$

R. $x = 1$

9. $y = \frac{x^2 - 1}{x^2 + 1}$

$[-\sqrt{3}; \sqrt{3}]$

R. $x = 0$

10. $y = \sqrt{x^3 - 12x}$

$] -2\sqrt{3}; 0[$

R. $x = -2$

11. $y = \frac{1}{\sqrt{1 - x^2}}$

$[-\frac{\sqrt{2}}{2}; \frac{\sqrt{2}}{2}]$

R. $x = 0$

12. $y = \sin x + \cos x$

$[0; \frac{\pi}{2}]$

R. $x = \frac{\pi}{4}$

13. $y = \cos x + \frac{1}{2} \sin 2x$

$[0; 2\pi]$

R. $x = \frac{\pi}{6}, x = \frac{5}{6}\pi, x = \frac{3}{2}\pi$

Per quali valori del parametro a le seguenti funzioni verificano le ipotesi del teorema di Rolle e per tali valori calcolare i punti di Rolle

- 40 $f(x) = \begin{cases} x + a & x \leq 0 \\ -x^2 + ax + a & x > 0 \end{cases}$ nell'intervallo $\left[-1, \frac{1+\sqrt{5}}{2}\right]$ $\left[a = 1, x = \frac{1}{2}\right]$
- 41 $f(x) = \begin{cases} x^2 & x \leq 0 \\ ax^3 & x > 0 \end{cases}$ nell'intervallo $[-2, 1]$ $[a = 4, x = 0]$
- 42 $f(x) = \begin{cases} x^2 + 2x & x \leq 0 \\ ax & x > 0 \end{cases}$ nell'intervallo $\left[-3, \frac{3}{2}\right]$ $[a = 2, x = -1]$
- 43 $f(x) = \begin{cases} x^2 - a & x < 0 \\ 1 - 3x - x^2 & x \geq 0 \end{cases}$ nell'intervallo $[-2, 1]$ $[\exists a]$
- 44 $f(x) = \begin{cases} (x - a)^2 & x < 1 \\ \ln^2 x & x \geq 1 \end{cases}$ nell'intervallo $[0, e]$ $[a = 1, x = 1]$
- 45 $f(x) = \begin{cases} x^2 + 3x & x < 0 \\ a \sin x & x \geq 0 \end{cases}$ nell'intervallo $[-3, \pi]$ $\left[a = 3, x = -\frac{3}{2}, x = \frac{\pi}{2}\right]$
- 46 $f(x) = \begin{cases} x^3 - x^2 & x \leq 1 \\ a(x^2 - 3x + 2) & x > 1 \end{cases}$ nell'intervallo $[0, 2]$ $\left[a = -1, x = 0, x = \frac{2}{3}, x = \frac{3}{2}\right]$
- 47 $f(x) = \begin{cases} 2x + 1 & x \leq 0 \\ -x^2 + ax + 1 & x > 0 \end{cases}$ nell'intervallo $[0, 6]$ $[a = 6, x = 3]$
- 48 $f(x) = \begin{cases} y = \cos x & x \leq 0 \\ y = a - x^2 & x > 0 \end{cases}$ nell'intervallo $\left[-\frac{3}{2}\pi, 1\right]$ $[a = 1, x = 0, x = -\pi]$
- 49 $f(x) = \begin{cases} y = -x^2 + ax & x \geq 0 \\ y = e^x - 1 & x < 0 \end{cases}$ nell'intervallo $\left[\ln \frac{3}{4}, \frac{\sqrt{2}+1}{2}\right]$ $\left[a = 1, x = \frac{1}{2}\right]$

Stabilire se le seguenti funzioni verificano le ipotesi del teorema di Lagrange ed in caso affermativo calcolare le ascisse dei punti di Lagrange

- 51 $f(x) = x^2 - 2x + 4$ in $[-1, 1]$ $[x = 0]$
- 52 $f(x) = 4x^2 + 3x - 1$ in $[1, 3]$ $[x = 2]$
- 54 $f(x) = x^3 + 2x$ in $[-1, 2]$ $[x = 1]$
- 55 $f(x) = \sqrt{x}$ in $[0, 4]$ $[x = 1]$
- 56 $f(x) = \frac{1}{x}$ in $[-1, 1]$ $[\text{non è definita in } x = 0]$

6. $y = \frac{x^2 - x + 4}{x - 1}$ $\left[\frac{3}{2}; 3\right]$

R. $x = 2$

$$57 \quad f(x) = 3x^4 - 5x^3 + 3x \quad \text{in } [0, 3] \quad [x = 2]$$

$$58 \quad f(x) = \frac{17x - 6}{x^2} \quad \text{in } [1, 2] \quad \left[x = \frac{3}{2} \right]$$

$$59 \quad f(x) = \sqrt[3]{x-2} \quad \text{in } [1, 3] \quad [\text{non è derivabile in } x = 2]$$

$$60 \quad f(x) = x^2 + x \quad \text{in } [4, 6] \quad [x = 5]$$

$$61 \quad f(x) = \frac{1}{1 + |x|} \quad \text{in } [-1, 2] \quad [\text{non è derivabile in } x = 0]$$

$$62 \quad f(x) = \frac{x}{1+x} \quad \text{in } [-17, -5] \quad [x = -9]$$

$$63 \quad f(x) = e^{|x|-1} \quad \text{in } [-1, 1] \quad [\text{non è derivabile in } x = 0]$$

$$64 \quad f(x) = x^3 - 4x^2 + x \quad \text{in } \left[\frac{1}{2}, 3 \right] \quad \left[x = \frac{13}{6} \right]$$

$$65 \quad f(x) = e^x \quad \text{in } [1, 2] \quad [x = \ln(e-1) + 1]$$

$$66 \quad f(x) = \ln(x+2) \quad \text{in } [-1, 2] \quad \left[x = \frac{3}{2 \ln 2} - 2 \right]$$

$$7. \quad y = 4x + \frac{1}{x-2} \quad \left[-\frac{5}{3}; -1 \right] \quad \text{R. } x = 2 - \sqrt{11}$$

$$8. \quad y = \sqrt{4x - x^2} \quad [0; 3] \quad \text{R. } x = 1$$

$$9. \quad y = \sqrt{1-x} \quad [-15; 0] \quad \text{R. } x = -\frac{21}{4}$$

$$10. \quad y = \sqrt{8x - x^2 - 12} \quad [3; 6] \quad \text{R. } x = 5$$

Per quali valori del parametro a le seguenti funzioni verificano le ipotesi del teorema di Lagrange e per tali valori calcolare i punti di Lagrange

$$68 \quad f(x) = \begin{cases} ax + 10 - 2a & x < 2 \\ x^2 + 3x & x \geq 2 \end{cases} \quad \text{in } [0, 3] \quad \left[a = 7, x = \frac{13}{6} \right]$$

$$69 \quad f(x) = \begin{cases} a(x^2 - 1) & x < 1 \\ \ln x & x \geq 1 \end{cases} \quad \text{in } [0, e] \quad \left[a = \frac{1}{2}, x = \frac{2e}{3}, x = \frac{3}{2e} \right]$$

$$70 \quad f(x) = \begin{cases} 1 + ax & x < 0 \\ e^x & x \geq 0 \end{cases} \quad \text{in } [-1, \ln 2] \quad \left[a = 1, x = \ln \frac{2}{\ln 2 + 1} \right]$$

$$71 \quad f(x) = \begin{cases} ax & x < 0 \\ -\frac{x}{x+1} & x \geq 0 \end{cases} \quad \text{in } [-1, 1] \quad \left[a = -1, x = -1 + \frac{2}{\sqrt{3}} \right]$$

$$72 \quad f(x) = \begin{cases} x^3 - 1 & x < 1 \\ \ln(x^a) & x \geq 1 \end{cases} \quad \text{in } [0, e] \quad \left[a = 3, x = \frac{3e}{4}, x = \frac{2}{\sqrt{3e}} \right]$$

Stabilire se le seguenti funzioni verificano le ipotesi del teorema di Cauchy ed in caso affermativo calcolare le ascisse dei punti di Cauchy

$$166 \quad f(x) = x^2 - 6x + 2 \quad g(x) = x^2 + 4 \quad \text{in } [-3, -1] \quad [x = -2]$$

$$167 \quad f(x) = x^2 + \frac{2}{5}x - 3 \quad g(x) = -x^2 + x \quad \text{in } \left[-3, \frac{1}{3}\right] \quad \left[x = -\frac{4}{3}\right]$$

$$168 \quad f(x) = \ln x \quad g(x) = \ln(x - 3) \quad \text{in } [2, 4] \quad [g(x) \text{ non è definita}]$$

$$169 \quad f(x) = x^2 + 1 \quad g(x) = x^3 + x \quad \text{in } [-2, 1] \quad \left[x = \frac{\sqrt{13} - 4}{3}\right]$$

$$170 \quad f(x) = \frac{1}{x} \quad g(x) = x^2 \quad \text{in } [1, 7] \quad [x = \sqrt[3]{28}]$$

$$171 \quad f(x) = e^x \quad g(x) = 2x^2 - 7 \quad \text{in } [-1, 1] \quad [\text{non è verificata una delle ipotesi}]$$

$$172 \quad f(x) = \sin x - 1 \quad g(x) = \cos x + 1 \quad \text{in } \left[0, \frac{\pi}{2}\right] \quad \left[x = \frac{\pi}{4}\right]$$

$$173 \quad f(x) = x^2 + 1 \quad g(x) = |x| + 1 \quad \text{in } [-1, 1] \quad [g(x) \text{ non è derivabile in } x = 0]$$

$$1. \quad f(x) = x^2 - 4x + 1, \quad g(x) = x - 3 \quad [1; 5] \quad \mathbf{R.} \quad x = 3$$

$$2. \quad f(x) = x^2 - 4x + 1, \quad g(x) = -\frac{1}{2}x^2 + 3x - \frac{3}{2} \quad [-2; 3] \quad \mathbf{R.} \quad x = \frac{1}{2}$$

$$3. \quad f(x) = -x^2 + 4x + 5, \quad g(x) = x^2 - 6x \quad [-1; 3] \quad \mathbf{R.} \quad x = 1$$

$$4. \quad f(x) = x^3 - x, \quad g(x) = 1 - x^2 \quad [-1; 2] \quad \mathbf{R.} \quad \text{Non esiste alcun punto}$$

$$5. \quad f(x) = -x^3 + 2x^2, \quad g(x) = x^2 + 3x - 10 \quad [-1; 3] \quad \mathbf{R.} \quad x = \frac{13 \pm \sqrt{304}}{15}$$

$$7. \quad f(x) = \frac{x-1}{x+3}, \quad g(x) = 2-x \quad [-2; 2] \quad \mathbf{R.} \quad x = \sqrt{5} - 3$$

$$8. \quad f(x) = \sin x, \quad g(x) = \cos x \quad [0; \pi] \quad \mathbf{R.} \quad x = \frac{\pi}{2}$$

$$9. \quad f(x) = 2 \sin x + \cos x, \quad g(x) = \sin x - 2 \cos x \quad \left[0; \frac{\pi}{2}\right] \quad \mathbf{R.} \quad x = \frac{\pi}{4}$$

$$10. \quad f(x) = \operatorname{tg} x, \quad g(x) = \operatorname{ctg} x \quad \left[\frac{\pi}{6}; \frac{\pi}{3}\right] \quad \mathbf{R.} \quad x = \frac{\pi}{4}$$

$$548. \quad f(x) = x^4 - x^2 + 3 \quad \text{e} \quad g(x) = x^4 + x^2 + 2 \quad \text{in } [0; 1]. \quad \left| \mathbf{R.} \quad c = \frac{\sqrt{2}}{2} \right.$$

$$549. \quad f(x) = \frac{2x+1}{x+1} \quad \text{e} \quad g(x) = \frac{x+2}{2x+1} \quad \text{in } [0; 2]. \quad \left| \mathbf{R.} \quad c = \frac{\sqrt{15}-1}{7} \right.$$

$$550. f(x) = \operatorname{sen} x \quad \text{e} \quad g(x) = \cos x \quad \text{in} \quad \left[0; \frac{\pi}{2}\right]. \quad \left| \quad R. \quad c = \frac{\pi}{4} \right.$$

$$552. f(x) = \operatorname{sen} x + \cos x \quad \text{e} \quad g(x) = \operatorname{sen} x - \cos x \quad \text{in} \quad \left[0; \frac{\pi}{2}\right]. \quad \left| \quad R. \quad c = \frac{\pi}{4} \right.$$