Ficha nº 4

200) $y = \ln x$; $y' = \frac{1}{x}$

201) $y = 4\ln x$; $y' = \frac{4}{x}$

202) $y = \ln x^3$; $y' = 3 \cdot \frac{1}{x}$

203) $y = \ln x - \operatorname{sen} x$; $y' = \frac{1}{x} - \cos x$

204) $y = 4\tan x + 2\ln x$; $y' = \frac{4}{\cos^2 x} + \frac{2}{x}$

205) $y = \ln x^5$; $y' = 5 \cdot \frac{1}{x}$

206) $y = \ln 3x$; $y' = \frac{1}{3x} \cdot 3 = \frac{1}{x}$

207) $y = \ln 4x^3$; $y' = \frac{1}{4x^3} \cdot 12x^2 = \frac{3}{x}$

208) $y = \ln 2x^4 + \ln x^3$; $y' = \frac{1}{2x^4} \cdot 8x^3 + 3\frac{1}{x} = \frac{4}{x} + \frac{3}{x} = \frac{7}{x}$

209) $y = 3\ln x - \ln x^2$; $y' = \frac{3}{x} - \frac{2}{x} = \frac{1}{x}$

210) $y = \ln \sqrt[3]{x}$; $y' = \frac{1}{3} \cdot \frac{1}{x}$

211) $y = -5\ln \sqrt{x^3}$; $y = -5 \cdot \frac{3}{2} \ln x$; $y' = -\frac{15}{2} \cdot \frac{1}{x}$

212) $y = 2\ln \sqrt{x} - \ln x^2 = 2 \cdot \frac{1}{2} \ln x - 2\ln x = -\ln x$; $y' = \frac{-1}{x}$

213) $y = \ln 5x$; $y' = \frac{1}{5x} \cdot 5 = \frac{1}{x}$

214) $y = 3\ln 2x^2$; $y' = 3 \cdot \frac{1}{2x^2} \cdot 4x = \frac{6}{x}$

215) $y = \log_3 x = \frac{\ln x}{\ln 3}$; $y' = \frac{1}{\ln 3} \cdot \frac{1}{x}$

216) $y = \log_2 x$; $y' = \frac{1}{\ln 2} \cdot \frac{1}{x}$

217) $y = \log x$; $y' = \frac{1}{\ln 10} \cdot \frac{1}{x}$

218) $y = \log_5 x$; $y' = \frac{1}{\ln 5} \cdot \frac{1}{x}$

219) $y = \log_2 3x = \frac{\ln 3x}{\ln 2}$; $y' = \frac{1}{\ln 2} \cdot \frac{1}{3x} \cdot 3 = \frac{1}{\ln 2} \cdot \frac{1}{x}$

220) $y=-3\log_4 x$; $y'=-\frac{3}{\ln 4}\cdot\frac{1}{x}$

221) $y=-5\log x^3$; $y'=-\frac{5}{\ln 10}\cdot 3\cdot\frac{1}{x}=\frac{-15}{\ln 10}\cdot\frac{1}{x}$

222) $y=\frac{1}{2}\log_3 x^2=\frac{1}{2}\cdot\frac{\ln x^2}{\ln 3}$; $y'=\frac{1}{2\ln 3}\cdot 2\cdot\frac{1}{x}=\frac{1}{\ln 3}\cdot\frac{1}{x}$

223) $y=\ln x-\log x$; $y'=\frac{1}{x}-\frac{1}{\ln 10}\cdot\frac{1}{x}$

224) $y=3\ln x^3-\log_3 x=9\ln x-\frac{\ln x}{\ln 3}$; $y'=\frac{9}{x}-\frac{1}{\ln 3}\cdot\frac{1}{x}$

225) $y=\log_2 x+2\ln x$; $y'=\frac{1}{\ln 2}\cdot\frac{1}{x}+2\cdot\frac{1}{x}$

226) $y=\frac{\log 3x}{4}=\frac{\ln 3x}{4\ln 10}$; $y'=\frac{1}{4\ln 10}\cdot\frac{1}{3x}\cdot 3=\frac{1}{4\cdot\ln 10}\cdot\frac{1}{x}$

227) $y=\log_5 4x^3=\frac{\ln 4x^3}{\ln 5}$; $y'=\frac{1}{\ln 5}\cdot\frac{1}{4x^3}\cdot 12x^2=\frac{3}{\ln 5}\cdot\frac{1}{x}$

228) $y=\frac{\ln x^2}{2}-\frac{\log x^2}{2}=\frac{2\ln x}{2}-\frac{2\ln x}{2\ln 10}$; $y'=\frac{1}{x}-\frac{1}{\ln 10}\cdot\frac{1}{x}$

229) $y=\log\sqrt[5]{x^3}=\frac{3}{5}\log x=\frac{3}{5}\cdot\frac{1}{\ln 10}\cdot\ln x$; $y'=\frac{3}{5\ln 10}\cdot\frac{1}{x}$

230) $y=\ln e^x=x$; $y'=1$

231) $y=\ln e^{2x}=2x$; $y'=2$

232) $y=3^x$; $y'=3^x\cdot\ln 3$

233) $y=5^x$; $y'=5^x\cdot\ln 5$

234) $y=-3(1+5^x)$; $y'=-3\cdot 5^x\cdot\ln 5$

235) $y=-3^x$; $y'=-3^x\cdot\ln 3$

236) $y=\frac{2^x}{3}$; $y'=\frac{1}{3}\cdot 2^x\cdot\ln 2$

237) $y=\log_2 x+2^x$; $y'=\frac{1}{\ln 2}\cdot\frac{1}{x}+2^x\cdot\ln 2$

238) $y = \ln x^4 - 4^x$; $y' = \frac{4}{x} - 4^x \cdot \ln 4$

239) $y = -2x^5 \ln x^2$; $y' = -10x^4 \cdot \ln x^2 - 2x^5 \cdot 2 \cdot \frac{1}{x}$

240) $y = 4\cos x . \ln x^3$; $y' = -4\sin x \cdot \ln x^3 + 4\cos x \cdot 3 \cdot \frac{1}{x}$

241) $y = 4x^2 . 4x = 4x^3$; $y' = 16 . 3 . x^2 = 48x^2$

242) $y = \frac{3x^2}{\ln x^2}$; $y' = \frac{6x \cdot \ln x^2 - 3x^2 \cdot \frac{2}{x}}{(\ln x^2)^2} = \frac{6x \cdot \ln x^2 - 6x}{(\ln x^2)^2}$

243) $y = \frac{\ln x + 5}{x^3}$; $y' = \frac{\frac{1}{x} \cdot x^3 - (\ln x + 5) \cdot 3x^2}{x^6} = \frac{x^2 - (\ln x + 5) \cdot 3x^2}{x^6}$

244) $y = \frac{2x}{\ln x} + 1$; $y' = \frac{2\ln x - 2x \cdot \frac{1}{x}}{(\ln x)^2} = \frac{2\ln x - 2}{(\ln x)^2}$

245) $y = \frac{2x}{\ln x + 1}$; $y' = \frac{2(\ln x + 1) - 2 \cdot \frac{1}{x}}{(\ln x + 1)^2}$

246) $y = \frac{2x + 1}{\ln x}$; $y' = \frac{2 \cdot \ln x - (2x + 1) \cdot \frac{1}{x}}{(\ln x)^2}$

247) $y = \ln(x^2 + 1)$; $y' = \frac{1}{x^2 + 1} . 2x$

248) $y = e^x . \ln(3x)$; $y' = e^x \cdot \ln 3x + e^x \cdot \frac{1}{3x} . 3$

249) $y = 2^{5x^2 - 1}$; $y' = e^{5x^2 - 1} \cdot \ln 2 . 10x$

250) $y = \ln(x^4)$; $y' = \frac{1}{x^4} . 4x^3 = \frac{4}{x}$

251) $y = (\ln x)^4$; $y' = 4(\ln x)^3 \cdot \frac{1}{x}$

252) $y = \ln\left(\frac{1}{x}\right) = \ln x^{-1} = -1 . \ln x$; $y' = -\frac{1}{x}$

253) $y = \ln(\tan x)$; $y' = \frac{1}{\tan x} \cdot \frac{1}{\cos^2 x} = \frac{1}{\frac{\sin x}{\cos x}} \cdot \frac{1}{\cos^2 x} = \frac{1}{\sin x \cdot \cos x}$

254) $y = e^{x^2+2x-1}$; $y' = e^{x^2+2x-1} \cdot (2x+1)$

255) $y = \ln(4x^2 - 5x)$; $y' = \frac{8x-5}{4x^2-5x}$

256) $y = \ln\left(\frac{4-5x}{2x+3}\right) = \ln(4-5x) - \ln(2x+3)$

$y' = \frac{-5}{4-5x} - \frac{2}{2x+3}$

257) $y = \ln\frac{x}{\sqrt{x^2-3}} = \ln x - \ln(\sqrt{x^2-3})$

$y' = \frac{1}{x} - \frac{1}{\sqrt{x^2-3}} \cdot 1$

258) $y = \ln\left(\frac{1-e^x}{1-e^x}\right) = \ln(1-e^x) - \ln(1-e^x) = 0!$

259) $y = \ln(\cos e^{2x})$; $y' = \frac{1}{\cos e^{2x}} \cdot (-\operatorname{sen} e^{2x}) \cdot e^{2x} \cdot 2$

260) $y = \ln\left[\sqrt{(1+senx)^3}\right] = \ln(1+\operatorname{sen}x)^{3/2} = \frac{3}{2} \cdot \ln(1+\operatorname{sen}x)$

$y' = \frac{3}{2} \cdot \frac{1}{1+\operatorname{sen}x} \cdot \cos x$

261) $y = \ln\left(\sqrt{\frac{senx-\cos x}{senx+\cos x}}\right) = \frac{1}{2}\left[\ln(\operatorname{sen}x - \cos x) - \ln(\operatorname{sen}x + \cos x)\right]$

$y' = \frac{1}{2}\left[\frac{\cos x + \operatorname{sen}x}{\operatorname{sen}x - \cos x} - \frac{\cos x - \operatorname{sen}x}{\operatorname{sen}x + \cos x}\right] =$

$= \frac{1}{2} \cdot \frac{\cos^2 x + 2\operatorname{sen}x\cos x + \operatorname{sen}^2 x - (\operatorname{sen}x - \cos x)(\cos x - \operatorname{sen}x)}{\operatorname{sen}^2 x - \cos^2 x}$

$= \frac{1}{2} \cdot \frac{1 + 2\operatorname{sen}x\cdot\cos x + \operatorname{sen}^2 x - 2\operatorname{sen}x\cdot\cos x + \cos^2 x}{\operatorname{sen}^2 x - \cos^2 x}$

$= \frac{1}{2} \cdot \frac{2}{\operatorname{sen}^2 - \cos^2 x} = \frac{1}{\operatorname{sen}^2 x - \cos^2 x}$