

dada tiene la forma  $3x^2 = x^3$ . 362. 30 m/seg. 363. 1, 2. 364. -1. 365.  $f'(x_0) = \frac{-1}{x_0^2}$ . 366. -1; 2;  $\operatorname{tg} \varphi = 3$ . Indicación. Empléense los resultados del ejemplo 3 y del problema 365. 367. Resolución.

- a)  $f'(0) = \lim_{\Delta x \rightarrow 0} \frac{\sqrt[5]{(\Delta x)^2}}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{1}{\sqrt[5]{\Delta x}} = \infty$ ; b)  $f'(1) = \lim_{\Delta x \rightarrow 0} \frac{\sqrt[5]{1+\Delta x} - 1}{\Delta x} =$   
 $= \lim_{\Delta x \rightarrow 0} \frac{1}{\sqrt[5]{(\Delta x)^4}} = +\infty$ ; c)  $f' \left( \frac{2k+1}{2} \pi \right) = \lim_{\Delta x \rightarrow 0} \left| \frac{\cos \left( \frac{2k+1}{2} \pi + \Delta x \right)}{\Delta x} \right| =$   
 $= \lim_{\Delta x \rightarrow 0} \frac{|\operatorname{sen} \Delta x|}{\Delta x} = -1$ ;  $f'_+ \left( \frac{2k+1}{2} \right) = \lim_{\Delta x \rightarrow +0} \frac{|\operatorname{sen} \Delta x|}{\Delta x} = 1$ . 368.  $5x^4 -$   
 $-12x^2 + 2$ . 369.  $-\frac{1}{3} + 2x - 2x^3$ . 370.  $2ax + b$ . 371.  $-\frac{15x^2}{a}$ . 372.  $mat^{m-1} +$   
 $+ b(m+n)t^{m+n-1}$ . 373.  $\frac{6ax^5}{\sqrt{a^2+b^2}}$ . 374.  $-\frac{\pi}{x^2}$ . 375.  $2x^{-\frac{1}{3}} - 5x^{\frac{3}{2}} - 3x^{-4}$ .  
 376.  $\frac{8}{3}x^{\frac{5}{3}}$ . Indicación.  $y = x^2x^{\frac{2}{3}} = x^{\frac{8}{3}}$ . 377.  $\frac{4b}{3x^2\sqrt[3]{x}} - \frac{2a}{3x\sqrt[3]{x^2}}$ .  
 378.  $\frac{bc-ad}{(c+dx)^2}$ . 379.  $\frac{-2x^2-6x+25}{(x^2-5x+5)^2}$ . 380.  $\frac{1-4x}{x^2(2x-1)^2}$ . 381.  $\frac{1}{\sqrt{x}(1-\sqrt{x})^2}$ .  
 382.  $5 \cos x - 3 \operatorname{sen} x$ . 383.  $\frac{4}{\operatorname{sen}^2 2x}$ . 384.  $\frac{-2}{(\operatorname{sen} x - \cos x)^2}$ . 385.  $t^2 \operatorname{sen} t$ .  
 386.  $y' = 0$ . 387.  $\operatorname{ctg} x - \frac{x}{\operatorname{sen}^2 x}$ . 388.  $\operatorname{arc} \operatorname{sen} x + \frac{x}{\sqrt{1-x^2}}$ . 389.  $x \operatorname{arctg} x$ .  
 390.  $x^6 e^x (x+7)$ . 391.  $x e^x$ . 392.  $e^x \frac{x-2}{x^3}$ . 393.  $\frac{5x^4-x^5}{e^x}$ . 394.  $e^x (\cos x - \operatorname{sen} x)$ .  
 395.  $x^2 e^x$ . 396.  $e^x \left( \operatorname{arc} \operatorname{sen} x + \frac{1}{\sqrt{1-x^2}} \right)$ . 397.  $\frac{(x^2 \ln x - 1)}{\ln^2 x}$ . 398.  $3x^2 \ln x$ .  
 399.  $\frac{2}{x} + \frac{\ln x}{x^2} - \frac{2}{x^2}$ . 400.  $\frac{2 \ln x}{x \ln 10} - \frac{1}{x}$ . 401.  $\operatorname{sh} x + x \operatorname{ch} x$ .  
 402.  $\frac{2x \operatorname{ch} x - x^2 \operatorname{sh} x}{\operatorname{ch}^2 x}$ . 403.  $-\operatorname{th}^2 x$ . 404.  $\frac{-3(x \ln x + \operatorname{sh} x \operatorname{ch} x)}{x \ln^2 x \operatorname{sh}^2 x}$ .  
 405.  $\frac{-2x^2}{1-x^4}$ . 406.  $\frac{1}{\sqrt{1-x^2}} \operatorname{Arsh} x + \frac{1}{\sqrt{1+x^2}} \operatorname{arc} \operatorname{sen} x$ . 407.  $\frac{x - \sqrt{x^2-1} \operatorname{Arch} x}{x^2 \sqrt{x^2-1}}$ .  
 408.  $\frac{1+2x \operatorname{Arctg} x}{(1-x^2)^2}$ . 410.  $\frac{3a}{c} \left( \frac{ax+b}{c} \right)^2$ . 411.  $12ab + 18b^2y$ .  
 412.  $16x(3+2x^2)^3$ . 413.  $\frac{x^2-1}{(2x-1)^3}$ . 414.  $\frac{-x}{\sqrt{1-x^2}}$ . 415.  $\frac{bx^2}{\sqrt[3]{(a+bx^3)^2}}$ .  
 416.  $-\sqrt{\sqrt{\frac{a^2}{x^2}-1}}$ . 418.  $\frac{1-\operatorname{tg}^2 x + \operatorname{tg}^4 x}{\cos^2 x}$ . 419.  $\frac{-1}{2 \operatorname{sen}^2 x \sqrt{\operatorname{ctg} x}}$ .  
 420.  $2 - 15 \cos^2 x \operatorname{sen} x$ . 421.  $\frac{-16 \cos 2t}{\operatorname{sen}^3 2t}$ . Indicación.  $x = \operatorname{sen}^{-2} t + \cos^{-2} t$ .  
 422.  $\frac{\operatorname{sen} x}{(1-3 \cos x)^3}$ . 423.  $\frac{\operatorname{sen}^3 x}{\cos^4 x}$ . 424.  $\frac{3 \cos x + 2 \operatorname{sen} x}{2 \sqrt{15 \operatorname{sen} x - 10 \cos x}}$ .  
 425.  $\frac{2 \cos x}{3 \sqrt[3]{\operatorname{sen} x}} + \frac{3 \operatorname{sen} x}{\cos^4 x}$ . 426.  $\frac{1}{2 \sqrt{1-x^2} \sqrt{1+\operatorname{arc} \operatorname{sen} x}}$ .

427.  $\frac{1}{2(1+x^2)\sqrt{\operatorname{arctg} x}} - \frac{3(\operatorname{arcsen} x)^2}{\sqrt{1-x^2}}$ . 428.  $\frac{-1}{(1+x^2)(\operatorname{arctg} x)^2}$ .
429.  $\frac{e^x + xe^x + 1}{2\sqrt{xe^x + x}}$ . 430.  $\frac{2e^x - 2^x \ln 2}{3\sqrt[3]{(2e^x - 2^x + 1)^2}} + \frac{5 \ln^4 x}{x}$ . 432.  $(2x-5) \times$   
 $\times \cos(x^2 - 5x + 1) - \frac{a}{x^2 \cos^2 \frac{a}{x}}$ . 433.  $-a \sin(\alpha x + \beta)$ . 434.  $\sin(2t + \varphi)$ .
435.  $-2 \frac{\cos x}{\operatorname{sen}^3 x}$ . 436.  $\frac{-1}{\operatorname{sen}^2 \frac{x}{a}}$ . 437.  $x \cos 2x^2 \operatorname{sen} 3x^2$ . 439.  $\frac{-2}{x\sqrt{x^2-1}}$ .
440.  $\frac{-1}{2\sqrt{x-x^2}}$ . 441.  $\frac{-1}{1+x^2}$ . 442.  $\frac{-1}{1+x^2}$ . 443.  $-10xe^{-x^2}$ .
444.  $-2x5^{-x^2} \ln 5$ . 445.  $2x10^{2x}(1+x \ln 10)$ . 446.  $\operatorname{sen} 2^t + 2^t t \cos 2^t \ln 2$ .
447.  $\frac{-e^x}{\sqrt{1-e^{2x}}}$ . 448.  $\frac{2}{2x+7}$ . 449.  $\operatorname{ctg} x \lg e$ . 450.  $\frac{-2x}{1-x^2}$ . 451.  $\frac{2 \ln x}{x}$   
 $-\frac{1}{x \ln x}$ . 452.  $\frac{(e^x + 5 \cos x)\sqrt{1-x^2} - 4}{(e^x + 5 \operatorname{sen} x - 4 \operatorname{arcsen} x)\sqrt{1-x^2}}$ . 453.  $\frac{1}{(1+\ln^2 x)x} +$   
 $+\frac{1}{(1+x^2)\operatorname{arctg} x}$ . 454.  $\frac{1}{2x\sqrt{\ln x+1}} + \frac{1}{2(\sqrt{x}+x)}$ . 455. Resolución.  
 $y' = (\operatorname{sen}^3 5x)' \cos^2 \frac{x}{3} + \operatorname{sen}^3 5x \left( \cos^2 \frac{x}{3} \right)' = 3 \operatorname{sen}^2 5x \cos 5x \cdot 5 \cos^2 \frac{x}{3} +$   
 $+ \operatorname{sen}^3 5x \cdot 2 \cos \frac{x}{3} \left( -\operatorname{sen} \frac{x}{3} \right) \frac{1}{3} = 15 \operatorname{sen}^2 5x \cos 5x \cos^2 \frac{x}{3} - \frac{2}{3} \operatorname{sen}^3 5x \cos x \times$   
 $\times \frac{x}{3} \operatorname{sen} \frac{x}{3}$ . 456.  $\frac{4x+3}{(x-2)^3}$ . 457.  $\frac{x^2+4x-6}{(x-3)^5}$ . 458.  $\frac{x^7}{(1-x^2)^5}$ .
459.  $\frac{x-1}{x^2\sqrt{2x^2-2x+1}}$ . 460.  $\frac{1}{\sqrt{(a^2+x^2)^3}}$ . 461.  $\frac{x^2}{\sqrt{(1+x^2)^5}}$ .
462.  $\frac{(1+\sqrt{x})^3}{\sqrt[3]{x}}$ . 463.  $x^5 \sqrt[3]{(1+x^3)^2}$ . 464.  $\frac{1}{\sqrt[4]{(x-1)^3(x+2)^5}}$ .
465.  $4x^3(a-2x^3)(a+5x^3)$ . 466.  $\frac{2abmnx^{n-1}(a-bx^n)^{m-1}}{(a-bx^n)^{m+1}}$ . 467.  $\frac{x^3-1}{(x+2)^6}$ .
468.  $\frac{a-3x}{2\sqrt{a-x}}$ . 469.  $\frac{3x^2+2(a+b+c)x+ab+bc+ac}{2\sqrt{(x+a)(x+b)(x+c)}}$ .
470.  $\frac{1+2\sqrt{y}}{6\sqrt{y}\sqrt{(y+\sqrt{y})^2}}$ . 471.  $2(7t+4)\sqrt[3]{3t+2}$ . 472.  $\frac{y-a}{\sqrt{(2ay-y^2)^3}}$ .
473.  $\frac{1}{\sqrt{e^x+1}}$ . 474.  $\operatorname{sen}^3 x \cos^2 x$ . 475.  $\frac{1}{\operatorname{sen}^2 x \cos^4 x}$ . 476.  $10 \operatorname{tg} 5x \operatorname{sec}^2 5x$ .
477.  $x \cos x^2$ . 478.  $3t^2 \operatorname{sen} 2t^3$ . 479.  $3 \cos x \cos 2x$ . 480.  $\operatorname{tg}^4 x$ . 481.  $\frac{\cos 2x}{\operatorname{sen}^4 x}$ .
482.  $\frac{(a-\beta) \operatorname{sen} 2x}{2\sqrt{a \operatorname{sen}^2 x + \beta \cos^2 x}}$ . 483. 0. 484.  $\frac{1}{2} \frac{\operatorname{arcsen} x (2 \operatorname{arccos} x - \operatorname{arcsen} x)}{\sqrt{1-x^2}}$ .
485.  $\frac{2}{x\sqrt{2x^2-1}}$ . 486.  $\frac{1}{1+x^2}$ . 478.  $\frac{x \operatorname{arccos} x - \sqrt{1-x^2}}{(1-x^2)^{3/2}}$ . 488.  $\frac{1}{\sqrt{a-bx^2}}$ .

489.  $\sqrt{\frac{a-x}{a+x}}$  ( $a > 0$ ). 490.  $2\sqrt{a^2-x^2}$  ( $a > 0$ ). 491.  $\frac{-x}{\sqrt{2x-x^2}}$ . 492.  $\arcsen \sqrt{x}$ .
493.  $\frac{5}{\sqrt{1-25x^2} \arccos 5x}$ . 494.  $\frac{1}{x\sqrt{1-\ln^2 x}}$ . 495.  $\frac{\operatorname{sen} \alpha}{1-2x \cos \alpha + x^2}$ .
496.  $\frac{1}{5+4 \operatorname{sen} x}$ . 497.  $4x \sqrt{\frac{x}{b-x}}$ . 498.  $\frac{\operatorname{sen}^2 x}{1+\cos^2 x}$ . 499.  $\frac{a}{2} \sqrt{e^{2x}}$ .
500.  $\operatorname{sen} 2xe^{\operatorname{sen}^2 x}$ . 501.  $2m^2 p (2ma^{mx} + b)^{p-1} a^{mx} \ln a$ . 502.  $e^{\alpha t} (\alpha \cos \beta t - \beta \operatorname{sen} \beta t)$ .
503.  $e^{\alpha x} \operatorname{sen} \beta x$ . 504.  $e^{-x} \cos 3x$ . 505.  $x^{n-1} a^{-x^2} (n-2x^2 \ln a)$ .
506.  $-\frac{1}{2} y \operatorname{tg} x (1 + \sqrt{\cos x} \ln a)$ . 507.  $\frac{3^{\operatorname{ctg} \frac{1}{x}} \ln 3}{\left(x \operatorname{sen} \frac{1}{x}\right)^2}$ . 508.  $\frac{2ax+b}{ax^2+bx+c}$ .
509.  $\frac{1}{\sqrt{a^2+x^2}}$ . 510.  $\frac{\sqrt{x}}{1+\sqrt{x}}$ . 511.  $\frac{1}{\sqrt{2ax+x^2}}$ . 512.  $\frac{-2}{x \ln^3 x}$ .
513.  $-\frac{1}{x^2} \operatorname{tg} \frac{x-1}{x}$ . 514.  $\frac{2x+11}{x^2-x-2}$ . Indicación.  $y = 5 \ln(x-2) - 3 \ln(x+1)$ . 515.  $\frac{3x^2-16x+19}{(x-1)(x-2)(x-3)}$ . 516.  $\frac{1}{\operatorname{sen}^3 x \cos x}$ . 517.  $\sqrt{x^2-a^2}$ .
518.  $\frac{-6x^2}{(3-2x^3) \ln(3-2x^3)}$ . 519.  $\frac{15a \ln^2(ax+b)}{ax+b}$ . 520.  $\frac{2}{\sqrt{x^2+a^2}}$ .
521.  $\frac{mx+n}{x^2-a^2}$ . 522.  $\sqrt{2} \operatorname{sen} \ln x$ . 523.  $\frac{1}{\operatorname{sen}^3 x}$ . 524.  $\frac{\sqrt{1+x^2}}{x}$ . 525.  $\frac{x+1}{x^3-1}$ .
526.  $\frac{3}{\sqrt{1-9x^2}} [2 \arccos 3x \ln 2 + 2(1-\arccos 3x)]$ . 527.  $\left(3^{\frac{\operatorname{sen} ax}{\cos bx}} \ln 3 + \frac{\operatorname{sen}^2 ax}{\cos^2 bx}\right) \times$   
 $\times \frac{a \cos ax \cos bx + b \operatorname{sen} ax \operatorname{sen} bx}{\cos^2 bx}$ . 528.  $\frac{1}{1+2 \operatorname{sen} x}$ . 529.  $\frac{1}{x(1+\ln^2 x)}$ .
530.  $\frac{1}{\sqrt{1-x^2} \arccos x} + \frac{\ln x}{x} + \frac{1}{x\sqrt{1-\ln^2 x}}$ . 531.  $-\frac{1}{x(1+\ln^2 x)}$ .
532.  $\frac{1}{x^4+x^2-2}$ . 533.  $\frac{2}{\cos x \sqrt{\operatorname{sen} x}}$ . 534.  $\frac{x^2-3x}{x^4-1}$ . 535.  $\frac{1}{1+x^3}$ .
536.  $\frac{\arccos x}{(1-x^2)^{3/2}}$ . 537.  $6 \operatorname{sh}^2 2x \cdot \operatorname{ch} 2x$ . 538.  $e^{\alpha x} (\alpha \operatorname{ch} \beta x + \beta \operatorname{sh} \beta x)$ .
539.  $6 \operatorname{th}^2 2x (1 - \operatorname{th}^2 2x)$ . 540.  $2 \operatorname{cth} 2x$ . 541.  $\frac{2}{\sqrt{a^4+x^4}}$ . 542.  $\frac{1}{x \sqrt{\ln^2 x - 1}}$ .
543.  $\frac{1}{\cos 2x}$ . 544.  $\frac{-1}{\operatorname{sen} x}$ . 545.  $\frac{2}{1-x^2}$ . 546.  $x \operatorname{Arth} x$ . 547.  $x \operatorname{Arsh} x$ .
548. a)  $y' = 1$  cuando  $x > 0$ ;  $y' = -1$  cuando  $x < 0$ ;  $y'(0)$  no existe;  
 b)  $y' = |2x|$ . 549.  $y' = \frac{1}{x}$ . 550.  $f'(x) = \begin{cases} -1 & \text{para } x \leq 0, \\ -e^{-x} & \text{para } x > 0. \end{cases}$  552.  $\frac{1}{2} + \frac{\sqrt{3}}{3}$ .
553.  $6\pi$ . 554. a)  $f'_-(0) = -1$ ,  $f'_+(0) = 1$ ; b)  $f'_-(0) = \frac{2}{a}$ ,  $f'_+(0) = \frac{-2}{a}$ ;  
 c)  $f'_-(0) = 1$ ,  $f'_+(0) = 0$ ; d)  $f'_-(0) = f'_+(0) = 0$ ; e)  $f'_-(0)$  y  $f'_+(0)$  no existen.
555.  $1-x$ . 556.  $2 + \frac{x-3}{4}$ . 557.  $-1$ . 558.  $0$ . 561. Resolución. Tenemos

Ejemplo 2. Hallar la derivada de la función

$$y = \operatorname{sen}^3 4x.$$

Solución. Haciendo

$$y = u^3; \quad u = \operatorname{sen} v; \quad v = 4x,$$

hallamos

$$y' = 3u^2 \cdot \cos v \cdot 4 = 12 \operatorname{sen}^2 4x \cos 4x.$$

Hallar las derivadas de las siguientes funciones (en los N<sup>os</sup> 368—408, no se emplea la regla de derivación de funciones compuestas):

### A. Funciones algebraicas

$$368. y = x^5 - 4x^3 + 2x - 3. \quad 375. y = 3x^{\frac{2}{3}} - 2x^{\frac{5}{2}} + x^{-3}.$$

$$369. y = \frac{1}{4} - \frac{1}{3}x + x^2 - 0.5x^4. \quad 376^*. y = x^2 \sqrt[3]{x^2}.$$

$$370. y = ax^2 + bx + c. \quad 377. y = \frac{a}{\sqrt[3]{x^2}} - \frac{b}{x\sqrt{x}}.$$

$$371. y = -\frac{5x^3}{a}. \quad 378. y = \frac{a+bx}{c+dx}.$$

$$372. y = at^m + bt^{m+n}. \quad 379. y = \frac{2x+3}{x^2-5x+5}.$$

$$373. y = \frac{ax^6+b}{\sqrt{a^2+b^2}}. \quad 380. y = \frac{2}{2x-1} - \frac{1}{x}.$$

$$374. y = \frac{\pi}{x} + \ln 2. \quad 381. y = \frac{1+\sqrt{x}}{1-\sqrt{x}}.$$

### B. Funciones trigonométricas y circulares inversas

$$382. y = 5 \operatorname{sen} x + 3 \operatorname{cos} x. \quad 386. y = \operatorname{arctg} x + \operatorname{arccotg} x.$$

$$383. y = \operatorname{tg} x - \operatorname{ctg} x. \quad 387. y = x \operatorname{ctg} x.$$

$$384. y = \frac{\operatorname{sen} x + \operatorname{cos} x}{\operatorname{sen} x - \operatorname{cos} x}. \quad 388. y = x \operatorname{arcsen} x.$$

$$385. y = 2t \operatorname{sen} t - (t^2 - 2) \operatorname{cos} t. \quad 389. y = \frac{(1+x^2) \operatorname{arctg} x - x}{2}.$$

### C. Funciones exponenciales y logarítmicas

$$390. y = x^7 \cdot e^x. \quad 396. y = e^x \operatorname{arcsen} x.$$

$$391. y = (x-1) e^x. \quad 397. y = \frac{x^2}{\ln x}.$$

$$392. y = \frac{e^x}{x^2}. \quad 398. y = x^3 \ln x - \frac{x^3}{3}.$$

$$393. y = \frac{x^5}{e^x}. \quad 399. y = \frac{1}{x} + 2 \ln x - \frac{\ln x}{x}.$$

$$394. f(x) = e^x \operatorname{cos} x. \quad 400. y = \ln x \lg x - \ln a \log_a x.$$

$$395. y = (x^2 - 2x + 2) e^x.$$

## D. Funciones hiperbólicas e hiperbólicas inversas

401.  $y = x \operatorname{sh} x.$       405.  $y = \operatorname{arctg} x - \operatorname{Arth} x.$

402.  $y = \frac{x^2}{\operatorname{ch} x}.$       406.  $y = \operatorname{arcsen} x \operatorname{Arsh} x.$

403.  $y = \operatorname{th} x - x.$       407.  $y = \frac{\operatorname{Arch} x}{x}.$

404.  $y = \frac{3 \operatorname{cth} x}{\ln x}.$       408.  $y = \frac{\operatorname{Arcth} x}{1-x^2}.$

## E. Funciones compuestas

Hallar las derivadas de las siguientes funciones (en los N<sup>os</sup> 409—466, es necesario aplicar la regla para derivar funciones compuestas de un argumento intermedio):

409\*\*.  $y = (1 + 3x - 5x^2)^{30}.$

Solución. Designemos  $1 + 3x - 5x^2 = u$ ; entonces  $y = u^{30}$ . Tendremos:

$$y'_u = 30u^{29}, \quad u'_x = 3 - 10x;$$

$$y'_x = 30u^{29} \cdot (3 - 10x) = 30(1 + 3x - 5x^2)^{29} \cdot (3 - 10x).$$

410.  $y = \left(\frac{ax+b}{c}\right)^3.$

411.  $f(y) = (2a + 3by)^2.$

412.  $y = (3 + 2x^2)^4.$

413.  $y = \frac{3}{56(2x-1)^7} - \frac{1}{24(2x-1)^6} - \frac{1}{40(2x-1)^5}.$

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

415.  $y = \sqrt[3]{a+bx^3}.$

416.  $y = (a^{2/3} - x^{2/3})^{3/2}.$

417.  $y = (3 - 2 \operatorname{sen} x)^5.$

Solución.  $y' = 5(3 - 2 \operatorname{sen} x)^4 \cdot (3 - 2 \operatorname{sen} x)' = 5(3 - 2 \operatorname{sen} x)^4 (-2 \cos x) = -10 \cos x (3 - 2 \operatorname{sen} x)^4.$

418.  $y = \operatorname{tg} x - \frac{1}{3} \operatorname{tg}^3 x + \frac{1}{5} \operatorname{tg}^5 x.$

419.  $y = \sqrt{\operatorname{ctg} x} - \sqrt{\operatorname{ctg} \alpha}.$

420.  $y = 2x + 5 \cos^3 x.$

421\*.  $x = \operatorname{cosec}^2 t + \sec^2 t.$

422.  $f(x) = -\frac{1}{6(1-3 \cos x)^2}.$

423.  $y = \frac{1}{3 \cos^3 x} - \frac{1}{\cos x}.$

424.  $y = \sqrt{\frac{3 \operatorname{sen} x - 2 \cos x}{5}}.$

425.  $y = \sqrt[3]{\operatorname{sen}^2 x} + \frac{1}{\cos^3 x}.$

426.  $y = \sqrt{1 + \operatorname{arcsen} x}.$

427.  $y = \sqrt{\operatorname{arctg} x} - (\operatorname{arcsen} x)^3.$

428.  $y = \frac{1}{\operatorname{arctg} x}.$

429.  $y = \sqrt{x e^x + x}.$

430.  $y = \sqrt[3]{2e^x - 2^x + 1} + \ln^5 x.$

431.  $y = \operatorname{sen} 3x + \cos \frac{x}{5} + \operatorname{tg} \sqrt{x}.$

Solución.  $y' = \cos 3x \cdot (3x)' - \operatorname{sen} \frac{x}{5} \left(\frac{x}{5}\right)' + \frac{1}{\cos^2 \sqrt{x}} (\sqrt{x})' = 3 \cos 3x -$   
 $-\frac{1}{5} \operatorname{sen} \frac{x}{5} + \frac{1}{2 \sqrt{x} \cos^2 \sqrt{x}}.$

432.  $y = \operatorname{sen}(x^2 - 5x + 1) + \operatorname{tg} \frac{a}{x}.$

433.  $f(x) = \cos(\alpha x + \beta).$

434.  $f(t) = \operatorname{sen} t \operatorname{sen}(t + \varphi).$

435.  $y = \frac{1 + \cos 2x}{1 - \cos 2x}.$

436.  $f(x) = a \operatorname{ctg} \frac{x}{a}.$

437.  $y = -\frac{1}{20} \cos(5x^2) - \frac{1}{4} \cos x^2.$

438.  $y = \operatorname{arcsen} 2x.$

Solución.  $y' = \frac{1}{\sqrt{1-(2x)^2}} \cdot (2x)' = \frac{2}{\sqrt{1-4x^2}}.$

439.  $y = \operatorname{arcsen} \frac{1}{x^2}.$

446.  $f(t) = t \operatorname{sen} 2^t.$

440.  $f(x) = \arccos \sqrt{x}.$

447.  $y = \arccos e^x.$

441.  $y = \operatorname{arctg} \frac{1}{x}.$

448.  $y = \ln(2x + 7).$

442.  $y = \operatorname{arctg} \frac{1+x}{1-x}.$

449.  $y = \lg \operatorname{sen} x.$

443.  $y = 5e^{-x^2}.$

450.  $y = \ln(1-x^2).$

444.  $y = \frac{1}{5x^2}.$

451.  $y = \ln^2 x - \ln(\ln x).$

445.  $y = x^2 10^{2x}$

452.  $y = \ln(e^x + 5 \operatorname{sen} x - 4 \operatorname{arcsen} x).$

453.  $y = \operatorname{arctg}(\ln x) + \ln(\operatorname{arctg} x).$

454.  $y = \sqrt{\ln x + 1} + \ln(\sqrt{x} + 1).$

## E. Funciones diversas

455\*\*.  $y = \operatorname{sen}^3 5x \cos^2 \frac{x}{3}.$

456.  $y = -\frac{11}{2(x-2)^2} - \frac{14}{x-2}.$

457.  $y = -\frac{15}{4(x-3)^4} - \frac{10}{3(x-3)^3} - \frac{1}{2(x-3)^2}.$

458.  $y = \frac{x^8}{8(1-x^2)^4}.$

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

460.  $y = \frac{x}{a^2 \sqrt{a^2 + x^2}}.$

461.  $y = \frac{x^3}{3 \sqrt{(1+x^2)^3}}.$

462.  $y = \frac{3}{2} \sqrt[3]{x^2} + \frac{18}{7} x \sqrt[6]{x} + \frac{9}{5} x^3 \sqrt[3]{x^2} + \frac{6}{13} x^2 \sqrt[6]{x}.$

463.  $y = \frac{1}{8} \sqrt[3]{(1+x^3)^8} - \frac{1}{5} \sqrt[3]{(1+x^3)^5}.$

464.  $y = \frac{4}{3} \sqrt[4]{\frac{x-1}{x+2}}.$

465.  $y = x^4 (a - 2x^3)^2.$

466.  $y = \left( \frac{a + bx^n}{a - bx^n} \right)^m.$

467.  $y = \frac{9}{5(x+2)^5} - \frac{3}{(x+2)^4} + \frac{2}{(x+2)^3} - \frac{1}{2(x+2)^2}.$

468.  $y = (a+x) \sqrt{a-x}.$

469.  $y = \sqrt{(x+a)(x+b)(x+c)}.$

470.  $z = \sqrt[3]{y + \sqrt{y}}.$

471.  $f(t) = (2t+1)(3t+2) \sqrt[3]{3t+2}.$

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

473.  $y = \ln(\sqrt{1+e^x} - 1) - \ln(\sqrt{1+e^x} + 1).$

474.  $y = \frac{1}{15} \cos^3 x (3 \cos^2 x - 5).$

475.  $y = \frac{(\operatorname{tg}^2 x - 1)(\operatorname{tg}^4 x + 10 \operatorname{tg}^2 x + 1)}{3 \operatorname{tg}^2 x}$ .
476.  $y = \operatorname{tg}^2 5x$ .
477.  $y = \frac{1}{2} \operatorname{sen}(x^2)$ .
478.  $y = \operatorname{sen}^2(t^3)$ .
479.  $y = 3 \operatorname{sen} x \cos^2 x + \operatorname{sen}^3 x$ .
480.  $y = \frac{1}{3} \operatorname{tg}^3 x - \operatorname{tg} x + x$ .
481.  $y = -\frac{\cos x}{3 \operatorname{sen}^3 x} + \frac{4}{3} \operatorname{ctg} x$ .
482.  $y = \sqrt{\alpha \operatorname{sen}^2 x + \beta \cos^2 x}$ .
483.  $y = \operatorname{arcsen} x^2 + \operatorname{arccos} x^2$ .
484.  $y = \frac{1}{2} (\operatorname{arcsen} x)^2 \operatorname{arccos} x$ .
485.  $y = \operatorname{arcsen} \frac{x^2 - 1}{x^2}$ .
486.  $y = \operatorname{arcsen} \frac{x}{\sqrt{1+x^2}}$ .
487.  $y = \frac{\operatorname{arccos} x}{\sqrt{1-x^2}}$ .
488.  $y = \frac{1}{\sqrt{b}} \operatorname{arcsen} \left( x \sqrt{\frac{b}{a}} \right)$ .
489.  $y = \sqrt{a^2 - x^2} + a \operatorname{arcsen} \frac{x}{a}$ .
490.  $y = x \sqrt{a^2 - x^2} + a^2 \operatorname{arcsen} \frac{x}{a}$ .
491.  $y = \operatorname{arcsen}(1-x) + \sqrt{2x-x^2}$ .
492.  $y = \left(x - \frac{1}{2}\right) \operatorname{arcsen} \sqrt{x} + \frac{1}{2} \sqrt{x-x^2}$ .
493.  $y = \ln(\operatorname{arcsen} 5x)$ .
494.  $y = \operatorname{arcsen}(\ln x)$ .
495.  $y = \operatorname{arctg} \frac{x \operatorname{sen} \alpha}{1 - x \cos \alpha}$ .
496.  $y = \frac{2}{3} \operatorname{arctg} \frac{5 \operatorname{tg} \frac{x}{2} + 4}{3}$ .
497.  $y = 3b^2 \operatorname{arctg} \sqrt{\frac{x}{b-x}} - (3b+2x) \sqrt{bx-x^2}$ .
498.  $y = -\sqrt{2} \operatorname{arctg} \frac{\operatorname{tg} x}{\sqrt{2}} - x$ .



499.  $y = \sqrt{e^{ax}}$ .

500.  $y = e^{\operatorname{sen}^2 x}$ .

501.  $F(x) = (2ma^{mx} + b)^p$ .

502.  $F(t) = e^{\alpha t} \cos \beta t$ .

503.  $y = \frac{(\alpha \operatorname{sen} \beta x - \beta \cos \beta x) e^{\alpha x}}{\alpha^2 + \beta^2}$ .

504.  $y = \frac{1}{10} e^{-x} (3 \operatorname{sen} 3x - \cos 3x)$ .

505.  $y = x^n a^{-x^2}$ .

506.  $y = \sqrt{\cos x} a^{\sqrt{\cos x}}$ .

507.  $y = 3^{\operatorname{ctg} \frac{1}{x}}$ .

508.  $y = \ln(ax^2 + bx + c)$ .

509.  $y = \ln(x + \sqrt{a^2 + x^2})$ .

510.  $y = x - 2\sqrt{x} + 2 \ln(1 + \sqrt{x})$ .

511.  $y = \ln(a + x + \sqrt{2ax + x^2})$ .

512.  $y = \frac{1}{\ln^2 x}$ .

513.  $y = \ln \cos \frac{x-1}{x}$ .

514\*.  $y = \ln \frac{(x-2)^5}{(x+1)^3}$ .

515.  $y = \ln \frac{(x-1)^3(x-2)}{x-3}$ .

516.  $y = -\frac{1}{2 \operatorname{sen}^2 x} + \ln \operatorname{tg} x$ .

517.  $y = \frac{x}{2} \sqrt{x^2 - a^2} - \frac{a^2}{2} \ln(x + \sqrt{x^2 - a^2})$ .

518.  $y = \ln \ln(3 - 2x^3)$ .

519.  $y = 5 \ln^3(ax + b)$ .

520.  $y = \ln \frac{\sqrt{x^2 + a^2} + x}{\sqrt{x^2 + a^2} - x}$ .

521.  $y = \frac{m}{2} \ln(x^2 - a^2) + \frac{n}{2a} \ln \frac{x-a}{x+a}$ .

522.  $y = x \cdot \operatorname{sen} \left( \ln x - \frac{\pi}{4} \right)$ .

523.  $y = \frac{1}{2} \ln \operatorname{tg} \frac{x}{2} - \frac{1}{2} \frac{\cos x}{\operatorname{sen}^2 x}$ .