Rapporto incrementale

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calcolare il rapporto incrementale $\Delta y/\Delta x$ delle seguenti funzioni nel punto x_0 assegnato

1	$y = x^2 + 1$	$x_0 = 2$	$4 + h$
2	$y = x^3 - x^2 - \frac{1}{2}$	$x_0 = 1$	$h^2 + 2h + 1$
3	$y = (2x + 1)^2$	$x_0 = 0$	$4(h + 1)$
4	$y = \frac{x + 2}{x - 1}$	$x_0 = 4$	$-\frac{1}{3 + h}$
5	$y = \frac{x - 1}{x}$	$x_0 = 5$	$\frac{1}{5(h + 5)}$
6	$y = \sqrt{x - 2}$	$x_0 = 2$	$\frac{1}{\sqrt{h}}$
7	$y = 2x^3 - 8x + 5$	$x_0 = -1$	$2h^2 - 6h - 2$
8	$y = \frac{x^2 + 1}{x - 2}$	$x_0 = 1$	$\frac{h + 4}{h - 1}$
9	$y = 2 - 3x^2$	$x_0 = 2$	$-3h - 12$
10	$y = \frac{1 - x}{x}$	$x_0 = 3$	$-\frac{1}{3h + 9}$
11	$y = \sqrt{6x + 1}$	$x_0 = 1$	$\frac{\sqrt{7 + 6h} - \sqrt{7}}{h}$
12	$y = \sqrt{x - 2}$	$x_0 = 2$	$\frac{\sqrt{h}}{h}$

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13	$y = ln(x-2)$	$x_0 = 3$	$\frac{1}{h} ln(h+1)$
14	$y = e^x + 2$	$x_0 = 0$	$\frac{e^h - 1}{h}$
15	$y = e^{x^2 - x}$	$x_0 = 1$	$\frac{e^{h^2+h} - 1}{h}$
16	$y = 2^{\frac{1}{2-x}}$	$x_0 = 3$	$\frac{2^{\frac{h}{h+1}} - 1}{2h}$
17	$y = ln(x-1)$	$x_0 = 2$	$\frac{ln(h+1)}{h}$
18	$y = cos\frac{x}{2}$	$x_0 = \pi$	$-\frac{1}{h} sin\frac{h}{2}$
19	$y = \sqrt{sin\, x}$	$x_0 = \frac{\pi}{2}$	$\frac{\sqrt{cosh} - 1}{h}$

calcolare il rapporto incrementale $\Delta y/\Delta x$ delle seguenti funzioni rispetto ad x_0 ed h assegnati

20	$y = x^3 + 5x$	$x_0 = -1$	$h = 1$	6
21	$y = \frac{1}{2}x^2 - \frac{3}{7}x + 2$	$x_0 = 3$	$h = \frac{1}{2}$	$\frac{79}{28}$
22	$y = \frac{3x+1}{x-1}$	$x_0 = 5$	$h = \frac{3}{2}$	$-\frac{2}{11}$
23	$y = \sqrt{2x+1} - 5$	$x_0 = 0$	$h = 1$	$\sqrt{3} - 1$
24	$y = \sqrt{x^2 - 1} + x$	$x_0 = 3$	$h = 1$	$\sqrt{15} - \sqrt{8} + 1$

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30	$y = \frac{x^2 + 7}{3 - x}$	$x_0 = 2$	$h = \frac{1}{2}$	31
31	$y = x^2 + 1$	$x_0 = 2$	$h = 2$	$h + 2x$
32	$y = \frac{x + 1}{x - 3}$	$x_0 = 4$	$h = 1$	-2
33	$y = \sqrt{x^2 - 4}$	$x_0 = -2$	$h = 5$	$\frac{\sqrt{5}}{5}$
34	$y = e^{2x+1}$	$x_0 = \frac{1}{2}$	$h = \frac{1}{4}$	$4e^2\left(\sqrt{e} - 1\right)$
35	$y = ln(2x) + \frac{x}{3}$	$x_0 = \frac{e^2}{2}$	$h = \frac{1}{2}$	$2\,log(e^2 + 1) - \frac{11}{3}$
36	$y = 4^{\frac{x}{2}}$	$x_0 = 0$	$h = 1$	1
37	$y = x + lnx$	$x_0 = 1$	$h = \frac{1}{4}$	$1 + 4ln\frac{5}{4}$
38	$y = e^{x+1}$	$x_0 = 1$	$h = 2$	$\frac{e^2(e^2 - 1)}{h}$
39	$y = sin\frac{x}{2}$	$x_0 = \pi$	$h = \frac{\pi}{2}$	$\frac{\sqrt{2} - 2}{\pi}$
40	$y = cos\,3x$	$x_0 = \frac{\pi}{6}$	$h = \frac{\pi}{3}$	0
41	$y = sen\,2x$	$x_0 = \frac{\pi}{4}$	$h = \frac{\pi}{6}$	$-\frac{3}{\pi}$

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applicando la definizione calcolare la derivata prima nel punto $x_0 = x$ delle seguenti funzioni

42	$y = \frac{x+3}{2x-1}$	$y' = -\frac{7}{(2x-1)^2}$
43	$y = x^3 + x + 1$	$y' = 3x^2 + 1$
44	$y = x^2 + 2x$	$y' = 2x + 2$
45	$y = \sqrt{x-1}$	$y' = \frac{1}{2\sqrt{x-1}}$
46	$y = \frac{1}{\sqrt{x}}$	$y' = -\frac{1}{2x\sqrt{x}}$
47	$y = \frac{x}{2} + 3x - \frac{1}{3}$	$y' = \frac{7}{2}$
48	$y = \sqrt{1-x^2}$	$y' = -\frac{x}{\sqrt{1-x^2}}$
49	$y = x(6-x)$	$y' = 6 - 2x$
50	$y = -2x^2 + 5x$	$y' = 5 - 4x$
51	$y = x^2 + 3x + 2$	$y' = 2x + 3$
52	$y = 5x^3 - 2x$	$y' = 15x^2 - 2$
53	$y = \frac{x}{x+4}$	$y' = \frac{4}{(x+4)^2}$
54	$y = \frac{x}{x-1} + \frac{x+2}{x^2-1}$	$y' = -\frac{2(x^2+3x+1)}{(x^2-1)^2}$

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55	$y = \frac{x^2 - 5}{x + 6}$	$y' = \frac{x^2 + 12x + 5}{(x + 6)^2}$
56	$y = \frac{x + 3}{11 - x^2}$	$y' = \frac{x^2 + 6x + 11}{(x^2 - 11)^2}$
57	$y = \sqrt{x} - 2x$	$y' = \frac{1}{2\sqrt{x}} - 2$
58	$y = x\sqrt{x} + x^2 - 7$	$y' = 2x + \frac{3\sqrt{x}}{2}$
59	$y = \sqrt{x^2} - \left(\sqrt{x}\right)^2$	$y' = \frac{\lvert x \rvert}{x} - 1$
60	$y = \frac{x^2}{\sqrt{x} + 5}$	$y' = \frac{\left(20 + 3\sqrt{x}\right)x}{2\left(5 + \sqrt{x}\right)^2}$
61	$y = \frac{2x}{x + 3}$	$y' = \frac{6}{(x + 3)^2}$
62	$y = \sqrt{2x - 1}$	$y' = \frac{1}{\sqrt{2x - 1}}$
63	$y = \frac{1}{2\sqrt{x + 5}}$	$y' = -\frac{1}{4(x + 5)\sqrt{x + 5}}$
64	$y = 2x^3 - 3x + 1$	$y' = 6x^2 - 3$
65	$y = \sqrt{x - 3}$	$y' = \frac{1}{2\sqrt{x - 3}}$
66	$y = e^{x-1}$	$y' = e^{x-1}$
67	$y = x\, e^x$	$y' = e^x + x\, e^x$
68	$y = ln(x + 2)$	$y' = \frac{1}{x + 2}$

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69	$y = ln\ 10^x$	$y' = ln\ 10$
70	$y = e^{2x}$	$y' = 2e^{2x}$
71	$y = xe^x + 3$	$y' = e^x(x+1)$
72	$y = \frac{e^x - e^{-x}}{2}$	$y' = \frac{e^x + e^{-x}}{2}$
73	$y = ln\ (10e^x) + ln\ \sqrt[3]{x}$	$y' = 1 + \frac{1}{3x}$
74	$y = ln\ (1+x) - ln\ (1-x^2)$	$y' = \frac{1}{1-x}$
75	$y = 4\ ln\ \sqrt{x+2}$	$y' = \frac{2}{x+2}$
76	$y = ln\left[1 - cos^2\left(x - \frac{\pi}{2}\right)\right]$	$y' = -2\ tan\ x$
77	$y = 2^{-2x}$	$y' = -2^{1-2x} ln2$
80	$y = \frac{e^{-x} - e^x}{2}$	$y' = -\frac{e^x + e^{-x}}{2}$
81	$y = x + e^{3x}$	$y' = 1 + 3e^{3x}$
82	$y = x^2 ln(x-3)$	$y' = 2\ xln(x-3) + \frac{x^2}{x-3}$
83	$y = ln\ (2x+3)$	$y' = \frac{2}{2x+3}$
84	$y = x^2 cos^2 x$	$y' = 2x\ cos^2 x - x^2\ sin\ 2x$

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85	$y = e^{tan\,\pi x}$	$y' = \frac{\pi e^{tan\,\pi x}}{cos^2 \pi x}$
86	$y = x\ sin\ x$	$y' = sinx + xcosx$
87	$y = x + cos\,x$	$y' = 1 - sin\,x$
88	$y = sin(x + 1)$	$y' = cos(x + 1)$
89	$y = sin\,(x + \pi)$	$y' = -cos\,x$
90	$y = sin^2 x$	$y' = sin\,2x$
91	$y = \frac{sin^2 2x}{2cos^2 x}\left(\frac{1}{2tan^2 x} + sin^2 x + \frac{cos^2 x}{2}\right)$	$y' = 4\,cos\,x\,sin^3 x$