Derivar las siguientes funciones:

1. $y = x$
2. $y = x^2$
3. $y = x^3$
4. $y = x^4$
5. $y = x^5$
6. $y = \dfrac{1}{x}$
7. $y = \dfrac{1}{x^2}$
8. $y = \dfrac{1}{x^3}$
9. $y = \dfrac{1}{x^4}$
10. $y = \sqrt{x}$
11. $y = \sqrt[3]{x}$
12. $y = \sqrt[4]{x}$
13. $y = \sqrt[3]{x^2}$
14. $y = \sqrt[4]{x^3}$
15. $y = \dfrac{1}{\sqrt{x}}$
16. $y = \dfrac{1}{\sqrt[3]{x}}$
17. $y = \dfrac{1}{\sqrt[3]{x^2}}$
18. $y = \dfrac{1}{\sqrt[5]{x^2}}$
19. $y = 3$
20. $y = 8$
21. $y = 3x$
22. $y = 4x^2$
23. $y = 2x^3$
24. $y = 7x^3$
25. $y = 8x^4$
26. $y = 2x^2$
27. $y = 6x^5$
28. $y = 6x$
29. $y = 9x^6$
30. $y = 4x^2 - 3x + 2$
31. $y = 2x^3 - 3x^2 + 7x - 5$
32. $y = x^6 - 3x^4 + 5x$
33. $y = 2x^5 - 4x^2 + 3x - 1$
34. $y = 3x^3 - 2x^2 + 1$
35. $y = 4x^5 - 2x^3 + 7x - 2$
36. $y = 4x^3 - 9x^2 + 3$
37. $y = (3x + 1)^2$
38. $y = (4x - 3)^3$
39. $y = (x - 2)^5$
40. $y = (7x + 5)^3$
41. $y = (3x^2 - 2x + 5)^2$
42. $y = (4x^2 - 3)^3$
43. $y = \sqrt{3x + 1}$
44. $y = \sqrt{x^2 + 1}$
45. $y = \sqrt{3x^2 - 2x + 7}$
46. $y = \sqrt[3]{x + 2}$
47. $y = \sqrt[3]{x^2}$
48. $y = \sqrt{x^2 - 2x + 2}$
49. $y = \dfrac{1}{\sqrt{x + 3}}$
50. $y = \dfrac{1}{(x^3 + 1)^2}$

Soluciones a la derivadas de la página anterior:

1. $y' = 1$
2. $y' = 2x$
3. $y' = 3x^2$
4. $y' = 4x^3$
5. $y' = 5x^4$
6. $y' = \dfrac{-1}{x^2}$
7. $y' = \dfrac{-2}{x^3}$
8. $y' = \dfrac{-3}{x^4}$
9. $y' = \dfrac{-4}{x^5}$
10. $y' = \dfrac{1}{2\sqrt{x}}$
11. $y' = \dfrac{1}{3\sqrt[3]{x^2}}$
12. $y' = \dfrac{1}{4\sqrt[4]{x^3}}$
13. $y' = \dfrac{2}{3\sqrt[3]{x}}$
14. $y' = \dfrac{3}{4\sqrt[4]{x}}$
15. $y' = \dfrac{-1}{2\sqrt{x^3}}$
16. $y' = \dfrac{-1}{3\sqrt[3]{x^4}}$
17. $y' = \dfrac{-2}{3\sqrt[3]{x^5}}$
18. $y' = \dfrac{-2}{5\sqrt[5]{x^7}}$
19. $y' = 0$
20. $y' = 0$
21. $y' = 3$
22. $y' = 8x$
23. $y' = 6x^2$
24. $y' = 21x^2$
25. $y' = 32x^3$
26. $y' = 4x$
27. $y' = 30x^4$
28. $y' = 6$
29. $y' = 54x^5$
30. $y' = 8x - 3$
31. $y' = 6x^2 - 6x + 7$
32. $y' = 6x^5 - 12x^3 + 5$
33. $y' = 10x^4 - 8x + 3$
34. $y' = 9x^2 - 4x$
35. $y' = 20x^4 - 6x^2 + 7$
36. $y' = 12x^2 - 18x$
37. $y' = 2 \cdot (3x + 1) \cdot 3$
38. $y' = 3 \cdot (4x - 3)^2 \cdot 4$
39. $y' = 5 \cdot (x - 2)^4$
40. $y' = 3 \cdot (7x + 5)^2 \cdot 7$
41. $y' = 2 \cdot (3x^2 - 2x + 5) \cdot (6x - 2)$
42. $y' = 3 \cdot (4x^2 - 3)^2 \cdot 8x$
43. $y' = \dfrac{3}{2\sqrt{3x + 1}}$
44. $y' = \dfrac{2x}{2\sqrt{x^2 + 1}}$
45. $y' = \dfrac{6x - 2}{2\sqrt{3x^2 - 2x + 7}}$
46. $y' = \dfrac{1}{3\sqrt[3]{(x + 2)^2}}$
47. $y' = \dfrac{2}{3\sqrt[3]{x}}$
48. $y' = \dfrac{2x - 2}{2\sqrt{x^2 - 2x + 2}}$
49. $y' = \dfrac{-1}{2\sqrt{(x + 3)^3}}$
50. $y' = \dfrac{-2 \cdot 3x^2}{(x^3 + 1)^3}$

Derivar las siguientes funciones:

1. $y = \dfrac{x}{2}$
2. $y = \dfrac{x^2}{5}$
3. $y = \dfrac{3x^2}{4}$
4. $y = \dfrac{3x^2 + x - 1}{2}$
5. $y = \dfrac{5x^3}{6}$
6. $y = \ln x$
7. $y = 3\ln x$
8. $y = \dfrac{\ln x}{2}$
9. $y = \dfrac{5\ln x}{3}$
10. $y = \ln(2x)$
11. $y = \ln(5x)$
12. $y = 4\ln(3x)$
13. $y = \dfrac{\ln(2x)}{3}$
14. $y = \ln x^2$
15. $y = \ln(3x^5)$
16. $y = 3\ln(x^2 - 3x + 1)$
17. $y = e^x$
18. $y = 3e^x$
19. $y = 7e^x$
20. $y = e^{2x}$
21. $y = e^{5x}$
22. $y = e^{x^2+1}$
23. $y = 3e^{3x+1}$
24. $y = e^{x^3+4x^2-2}$
25. $y = 7e^{x-2}$
26. $y = e^{\frac{x}{2}}$
27. $y = 5e^{\frac{x^2}{3}}$
28. $y = 3^x$
29. $y = 5^x$
30. $y = 2^{x^2}$
31. $y = \ln(5x^4 - 3x^2 + 7)$
32. $y = e^{\ln x}$
33. $y = \ln e^x$
34. $y = 2^{3x}$
35. $y = 5^{x^2+1}$
36. $y = e^{3x^4+4x-1}$
37. $y = e^x + 1$
38. $y = e^{2x} + 3e^x - 2$
39. $y = \ln \dfrac{x+1}{x-1}$
40. $y = \ln \dfrac{x^2+3}{x}$
41. $y = \dfrac{1}{x}$
42. $y = \dfrac{3}{x^2}$
43. $y = (\ln x)^2$
44. $y = (2\ln x)^3$
45. $y = (e^x + 1)^3$
46. $y = 2e^x + 5\ln x$
47. $y = (2e^x + 5\ln x)^2$
48. $y = 3e^{2x+1}$
49. $y = e^{2\ln x}$
50. $y = \ln e^{2x}$

Soluciones a las derivadas de la página anterior:

1. $y' = \frac{1}{2}$
2. $y' = \frac{2x}{5}$
3. $y' = \frac{6x}{4}$
4. $y' = \frac{6x+1}{2}$
5. $y' = \frac{15x^2}{6}$
6. $y' = \frac{1}{x}$
7. $y' = \frac{3}{x}$
8. $y' = \frac{1}{2x}$
9. $y' = \frac{5}{3x}$
10. $y' = \frac{1}{x}$
11. $y' = \frac{1}{x}$
12. $y' = \frac{4}{x}$
13. $y' = \frac{1}{3x}$
14. $y' = \frac{2}{x}$
15. $y' = \frac{5}{x}$
16. $y' = \frac{3 \cdot (2x-3)}{x^2-3x+1)}$
17. $y' = e^x$
18. $y' = 3e^x$
19. $y' = 7e^x$
20. $y' = e^{2x} \cdot 2$
21. $y' = e^{5x} \cdot 5$
22. $y' = e^{x^2+1} \cdot 2x$
23. $y' = 3e^{3x+1} \cdot 3$
24. $y' = e^{x^3+4x^2-2} \cdot (3x^2+8x)$
25. $y' = 7e^{x-2}$
26. $y' = e^{\frac{x}{2}} \frac{1}{2}$
27. $y' = 5e^{\frac{x^2}{3}} \cdot \frac{2x}{3}$
28. $y' = 3^x \ln 3$
29. $y' = 5^x \ln 5$
30. $y' = 2^{x^2} \cdot 2x \cdot \ln 2$
31. $y' = \frac{20x^3-6x}{5x^4-3x^2+7}$
32. $y' = 1$
33. $y' = 1$
34. $y' = 2^{3x} \cdot 3 \cdot \ln 2$
35. $y' = 5^{x^2+1} \cdot (2x) \cdot \ln 5$
36. $y' = e^{3x^4+4x-1} \cdot (12x^3+4)$
37. $y' = e^x$
38. $y' = e^{2x} \cdot 2 + 3e^x$
39. $y' = \frac{1}{x+1} + \frac{1}{x-1}$
40. $y' = \frac{2x}{x^2+3} - \frac{1}{x}$
41. $y' = \frac{-1}{x^2}$
42. $y' = \frac{-6}{x^3}$
43. $y' = 2(\ln x) \cdot \frac{1}{x}$
44. $y' = 3(2\ln x)^2 \cdot \frac{2}{x}$
45. $y' = 3(e^x+1)^2 \cdot e^x$
46. $y' = 2e^x + \frac{5}{x}$
47. $y' = 2(2e^x + 5\ln x) \cdot \left(2e^x + \frac{5}{x}\right)$
48. $y' = 3e^{2x+1} \cdot 2$
49. $y' = 2x$
50. $y' = 2$

Derivar las siguientes funciones:

1. $y = \operatorname{sen} x$
2. $y = 2 \operatorname{sen} x$
3. $y = \dfrac{\operatorname{sen} x}{3}$
4. $y = \operatorname{sen} 2x$
5. $y = \operatorname{sen} 3x$
6. $y = \operatorname{sen} \frac{x}{2}$
7. $y = 5 \operatorname{sen} 2x$
8. $y = \operatorname{sen}^2 x$
9. $y = 2 \operatorname{sen}^3 x$
10. $y = \operatorname{sen}^2 \frac{x}{2}$
11. $y = \cos x$
12. $y = \cos 3x$
13. $y = \cos \frac{x}{2}$
14. $y = 3 \cos x$
15. $y = cos^2 x$
16. $y = \cos^3 x$
17. $y = 6 \cos^2 x$
18. $y = 4 \cos^3 2x$
19. $y = \operatorname{sen} x + \cos x$
20. $y = \operatorname{sen}^2 x + \cos^2 x$
21. $y = \sec x$
22. $y = \operatorname{cosec} x$
23. $y = \operatorname{tg} x$
24. $y = 4 \operatorname{tg} x$
25. $y = \operatorname{tg}^2 x$
26. $y = 3 \operatorname{tg}^2 x$
27. $y = 6 \operatorname{tg}^3 x$
28. $y = \operatorname{cotg} x$
29. $y = 1 + \operatorname{tg}^2 x$
30. $y = \sec^2 x$
31. $y = \operatorname{tg} 2x$
32. $y = 3 \operatorname{tg} \frac{x}{2}$
33. $y = 6 \operatorname{tg}^3 2x$
34. $y = \operatorname{arsen} x$
35. $y = \arccos x$
36. $y = \operatorname{artg} x$
37. $y = 3\operatorname{arsen} 2x$
38. $y = \operatorname{arsen} x + \arccos x$
39. $y = \sqrt{1 + \cos x}$
40. $y = \ln \operatorname{sen} x$
41. $y = \ln \cos x$
42. $y = \sqrt{\operatorname{sen} x + \cos x}$
43. $y = \dfrac{1}{1 + \operatorname{tg}^2 x}$
44. $y = 3 \ln \operatorname{sen}^3 x$
45. $y = \dfrac{1}{\ln x}$
46. $y = \sqrt{1 - \cos^2 x}$
47. $y = e^{\operatorname{sen} x}$
48. $y = 3e^{2 \cos^2 x}$
49. $y = \dfrac{1}{1 + x^2}$
50. $y = \sqrt{\dfrac{1 + \cos x}{2}}$

Soluciones a la derivadas de la página anterior:

1. $y' = \cos x$
2. $y' = 2\cos x$
3. $y' = \dfrac{\cos x}{3}$
4. $y' = \cos 2x \cdot 2$
5. $y' = \cos 3x \cdot 3$
6. $y' = \cos \frac{x}{2} \cdot \dfrac{1}{2}$
7. $y' = 5\cos 2x \cdot 2$
8. $y' = 2\operatorname{sen} x \cos x$
9. $y' = 6\operatorname{sen}^2 x \cos x$
10. $y' = 2\operatorname{sen} \frac{x}{2} \cos \frac{x}{2} \cdot \frac{1}{2}$
11. $y' = -\operatorname{sen} x$
12. $y' = -\operatorname{sen} 3x \cdot 3$
13. $y' = -\operatorname{sen} \frac{x}{2} \cdot \frac{1}{2}$
14. $y' = -3\operatorname{sen} x$
15. $y' = 2\cos x \cdot (-\operatorname{sen} x)$
16. $y' = 3\cos^2 x \cdot (-\operatorname{sen} x)$
17. $y' = 12\cos x \cdot (-sen x)$
18. $y' = 12\cos^2 2x \cdot (-\operatorname{sen} 2x) \cdot 2$
19. $y' = \cos x - \operatorname{sen} x$
20. $y' = 0$
21. $y' = \frac{\operatorname{sen} x}{\cos^2 x}$
22. $y' = \frac{-cos x}{\operatorname{sen}^2 x}$
23. $y' = 1 + \operatorname{tg}^2 x$
24. $y' = 4(1 + \operatorname{tg}^2 x)$
25. $y' = 2\operatorname{tg} x \cdot (1 + \operatorname{tg}^2 x)$
26. $y' = 6\operatorname{tg} x \cdot (1 + \operatorname{tg}^2 x)$
27. $y' = 18\operatorname{tg}^2 x \cdot (1 + \operatorname{tg}^2 x)$
28. $y' = -(1 + \operatorname{cotg}^2 x) = \frac{-1}{\operatorname{sen}^2 x}$
29. $y' = 2\operatorname{tg} x \cdot (1 + \operatorname{tg}^2 x)$
30. $y' = 2\sec x \cdot \frac{\operatorname{sen} x}{\cos^2 x}$
31. $y' = (1 + \operatorname{tg}^2 2x) \cdot 2$
32. $y' = 3(1 + \operatorname{tg}^2 \frac{x}{2}) \cdot \frac{1}{2}$
33. $y' = 18\operatorname{tg}^2 2x \cdot (1 + \operatorname{tg}^2 2x) \cdot 2$
34. $y' = \frac{1}{\sqrt{1-x^2}}$
35. $y' = \frac{-1}{\sqrt{1-x^2}}$
36. $y' = \frac{1}{1+x^2}$
37. $y' = \frac{3 \cdot 2}{\sqrt{1-(2x)^2}}$
38. $y' = 0$
39. $y' = \frac{-sen x}{2\sqrt{1+\cos x}}$
40. $y' = \frac{\cos x}{\operatorname{sen} x} = \operatorname{cotg} x$
41. $y' = \frac{-\operatorname{sen} x}{\cos x} = -\operatorname{tg} x$
42. $y' = \frac{\cos x - \operatorname{sen} x}{2\sqrt{\operatorname{sen} x + \cos x}}$
43. $y' = \frac{-1 \cdot 2\operatorname{tg} x \cdot (1+\operatorname{tg}^2 x)}{(1+\operatorname{tg}^2 x)^2}$
44. $y' = 9\frac{3\cos 3x}{\operatorname{sen} x}$
45. $y' = \frac{-1}{(\ln x)^2} \cdot \frac{1}{x}$
46. $y' = \cos x$
47. $y' = e^{\operatorname{sen} x} \cos x$
48. $y' = 3e^{2\cos^2 x} 4\cos x \cdot (-\operatorname{sen} x)$
49. $y' = \frac{-2x}{(1+x^2)^2}$
50. $y' = \frac{\frac{-\operatorname{sen} x}{2}}{2\sqrt{\frac{1+\cos x}{2}}}$

Derivar las siguientes funciones:

1. $y = x^2 e^x$
2. $y = 3x\sqrt{x}$
3. $y = x^3 \operatorname{sen} x$
4. $y = \cos x \ln x$
5. $y = 2 \operatorname{sen} x \cos x$
6. $y = e^{2x} \ln x$
7. $y = \sqrt{x} \operatorname{sen} x$
8. $y = \cos x \operatorname{artg} x$
9. $y = e^{3x^2} \operatorname{tg} x$
10. $y = \operatorname{tg} \frac{x}{2} \ln \sqrt{x}$
11. $y = \dfrac{x+3}{2x-1}$
12. $y = \dfrac{x^2+1}{x^2-1}$
13. $y = \dfrac{2x}{1-x^2}$
14. $y = \dfrac{e^x}{x^2}$
15. $y = \dfrac{4x-1}{(x-3)^2}$
16. $y = \dfrac{x^2-3x+1}{(2x-3)^3}$
17. $y = \dfrac{\ln x}{x}$
18. $y = \dfrac{\operatorname{artg} x}{x^2}$
19. $y = \dfrac{\cos x}{1+\operatorname{sen} x}$
20. $y = \dfrac{e^{3x}}{(\ln x)^2}$
21. $y = \sqrt{\operatorname{sen} x}$
22. $y = 5\sqrt{\ln \cos 2x}$
23. $y = \sqrt{\dfrac{1+x}{1-x}}$
24. $y = \dfrac{e^x}{x \operatorname{sen} x}$
25. $y = (x \operatorname{tg} x)^3$
26. $y = \left(\dfrac{3-x^2}{3+x^2}\right)^3$
27. $y = \operatorname{artg} \frac{1}{\mathrm{x}}$
28. $y = e^{\frac{1}{x^2}}$
29. $y = \dfrac{e^x+1}{e^x-1}$
30. $y = \cos^2 x - \operatorname{sen}^2 x$
31. $y = (2x-1)^3 \cos^2 x$
32. $y = 5x^3 \operatorname{tg}^2 x$
33. $y = \dfrac{\sqrt{x}}{(x^2+1)^2}$
34. $y = xe^x - x$
35. $y = 7x^2 \ln \dfrac{3}{x}$
36. $y = \operatorname{sen} \dfrac{1}{x^2}$
37. $y = \dfrac{4x^2-4}{(x^2+3)^2}$
38. $y = (3x^2-1)\ln(1-x)$
39. $y = e^{x \ln x}$
40. $y = (\arccos x)^2$
41. $y = \ln x^2 - (\ln x)^2$
42. $y = 5\arccos x^2$
43. $y = x^x$
44. $y = x^{\operatorname{sen} x}$
45. $y = (\operatorname{tg}^2 x - 1)^3$
46. $y = \ln \operatorname{tg} x$
47. $y = (\operatorname{sen} x)^{2x}$

Soluciones a la derivadas de la página anterior:

1. $y' = 2xe^x + e^x x^2$
2. $y' = 3\sqrt{x} + \frac{1}{2\sqrt{x}} \cdot 3x$
3. $y' = 3x^2 \operatorname{sen} x + \cos x \cdot x^3$
4. $y' = -\operatorname{sen} x \ln x + \frac{1}{x} \cos x$
5. $y' = 2\cos x \cos x - \operatorname{sen} x \cdot 2 \operatorname{sen} x$
6. $y' = e^{2x} \cdot 2\ln x + \frac{1}{x} e^{2x}$
7. $y' = \frac{1}{2\sqrt{x}} \operatorname{sen} x + \cos x \sqrt{x}$
8. $y' = -\operatorname{sen} x \operatorname{artg} x + \frac{1}{1+\mathrm{x}^2} \cos \mathrm{x}$
9. $y' = e^{3x^2} \cdot 6x \operatorname{tg} x + (1 + \operatorname{tg}^2 x) e^{3x^2}$
10. $y' = (1 + \operatorname{tg}^2 \frac{x}{2}) \frac{1}{2} \ln \sqrt{x} + \frac{1}{2x} \operatorname{tg} \frac{x}{2}$
11. $y' = \dfrac{1 \cdot (2x-1) - 2 \cdot (x+3)}{(2x-1)^2}$
12. $y' = \dfrac{2x(x^2-1) - 2x(x^2+1)}{(x^2-1)^2}$
13. $y' = \dfrac{2(1-x^2) - (-2x)x}{(1-x^2)^2}$
14. $y' = \dfrac{e^x x^2 - 2xe^x}{x^4}$
15. $y' = \dfrac{4(x-3)^2 - 2(x-3)(4x-1)}{(x-3)^4}$
16. $y' = \dfrac{(2x-3)(2x-3)^3 - 3(2x-3)^2 \cdot 2(x^2-3x+1)}{(2x-3)^6}$
17. $y' = \dfrac{\frac{1}{x} \cdot x - 1 \cdot \ln x}{x^2}$
18. $y' = \dfrac{\frac{1}{1+x^2} \cdot x^2 - 2x \cdot \operatorname{artg} x}{x^4}$
19. $y' = \dfrac{-\operatorname{sen} x 1 + \operatorname{sen} x) - \cos x \cos x}{(1 + \operatorname{sen} x)^2}$
20. $y' = \dfrac{e^{3x} \cdot 3(\ln x)^2 - 2\ln x \cdot \frac{1}{x} e^{3x}}{(\ln x)^4}$
21. $y' = \frac{\cos x}{2\sqrt{\operatorname{sen} x}}$
22. $y' = \frac{5}{2\sqrt{\ln \cos 2x}} \cdot \frac{sen2x}{\cos 2x} \cdot 2$
23. $y' = \frac{1}{2\sqrt{\frac{1+x}{1-x}}} \frac{1 \cdot (1-x) - (-1)(1+x)}{(1-x)^2}$
24. $y' = \frac{e^x x \operatorname{sen} x - (1 \cdot \operatorname{sen} x + \cos x \cdot x) e^x}{(x \operatorname{sen} x)^2}$
25. $y' = 3(x \operatorname{tg} x)^2 [1 \operatorname{tg} x + (1 + \operatorname{tg}^2 x) \cdot x]$
26. $y' = 3 \left(\frac{3-x^2}{3+x^2} \right)^2 \frac{-2x \cdot (3+x^2) + 2x(3-x^2)}{(3+x^2)^2}$
27. $y' = \frac{1}{1+\frac{1}{x^2}} \frac{-1}{x^2}$
28. $y' = e^{\frac{1}{x^2}} \frac{-2}{x^3}$
29. $y' = \dfrac{e^x(e^x - 1) - e^x(e^x + 1)}{(e^x - 1)^2}$
30. $y' = -2\cos x \operatorname{sen} x - 2 \operatorname{sen} x \cos x$
31. $y' = 3(2x-1)^2 \cdot 2 \cdot \cos^2 x + 2\cos x(-\operatorname{sen} x)(2x-1)^3$
32. $y' = 15x^2 \cdot \operatorname{tg}^2 x + 2 \operatorname{tg} x (1 + \operatorname{tg}^2 x) \cdot 5x^3$
33. $y' = \frac{\frac{1}{2\sqrt{x}} (x^2+1)^2 - 2(x^2+1) \cdot 2x\sqrt{x}}{(x^2+1)^4}$
34. $y' = 1 \cdot e^x + e^x x - 1$
35. $y' = 14x \ln \frac{3}{x} + \frac{1}{\frac{3}{x}} \frac{-3}{x^2} \cdot 7x^2$
36. $y' = \cos \frac{1}{x^2} \cdot \frac{-2}{x^3}$
37. $y' = \frac{8x(x^2+3)^2 - 2(x^2+3) \cdot 2x \cdot (4x^2-4)}{(x^2+3)^4}$
38. $y' = 6x \ln(1-x) + \frac{-1}{1-x} (3x^2 - 1)$
39. $y' = e^{x \ln x} (1 \cdot \ln x + \frac{1}{x} \cdot x)$
40. $y' = 2(\arccos x) \cdot \frac{-1}{\sqrt{1-\mathrm{x}^2}}$

41. $y' = \frac{2}{x} - 2(\ln x) \cdot \frac{1}{x}$

42. $y' = \frac{-5}{\sqrt{1-x^4}} \cdot 2x$

43. (igual que $y = e^{x \ln x}$)

44. $y' = e^{\operatorname{sen} x \ln x}(\cos x \ln x + \frac{1}{x} \operatorname{sen} x)$

45. $y' = 3(\operatorname{tg}^2 x - 1)^2 \cdot 2 \operatorname{tg} x \cdot (1 + \operatorname{tg}^2 x)$

46. $y' = \frac{1+\operatorname{tg}^2 x}{\operatorname{tg} x}$

47. $y' = e^{2x \ln \operatorname{sen} x}(2 \ln \operatorname{sen} x + \frac{\cos x}{\operatorname{sen} x} \cdot 2x)$