Calculus exercises

Manuel Lleonart Anguix

Exercise 4. Find the derivatives of the following functions:

1. $-\frac{10}{x^3}$

2. $\frac{-2}{(x-1)^2}$

3. $20x^3 + 15x^2 + 34x - 3$

4. $\frac{1}{2\sqrt{x}}$

5. $\frac{-1}{2x^{\frac{3}{2}}}$

6. $\frac{-3}{2x^{\frac{5}{2}}}$

7. $-\frac{8\sqrt[3]{x^2}+9\sqrt{x}}{6x^3}$

8. $\frac{x^5}{5} + \frac{x^4}{2} + x^3 + x^2 + x$

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

10. 1

11. $\frac{e^{\sqrt{x}}}{2\sqrt{x}}$

12. $-2^{4-x^2} \cdot 5^{3-x^2} x \log(10)$

13. $-\frac{e^{-x}}{2}$

14. $2x\cos(x^2)$

15. $\frac{2e^{2x}(x-1)}{x^3}$

16. $\frac{x^2+4x-1}{(x+2)(x^2+1)}$

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

18. $\frac{1}{2((1-x)-2x\log(x)+\log(x))}$

19. $x(x\cot x + 2\log(\sin x))$

20. 0

21. 0

22. $\frac{1}{2}(-3x^2 - 1)$

23. $\frac{\log(2)}{2\sqrt{2^x}}$

24. $\frac{\cos(x)}{\sin(x)+3}$

25. $\frac{1}{\sin(x)}\left(\frac{1}{x} - \log(x)\cot(x)\right)$

26. $-\frac{1}{\tan(x+1)}\frac{1}{\sin(x+1)}$

27. $2x(5x^3 + 3x - 2)\sin((x^2 + 1)(x^3 - 1))\cos((x^2 + 1)(x^3 - 1))$

28. $e^x\left(\frac{1}{x-1} + \log(x - 1)\right)$

29. $\cos(x)$

30. $\frac{2x}{(x^2+1)^2+1}$

Exercise 7. Solve the following integrals.

1.
$$\frac{-5x}{7x^{\frac{12}{5}}} + C$$

2.
$$\frac{1}{4}(x + 2)^4 + C$$

3.
$$\frac{x^4}{2} + x^3 + \frac{3x^2}{2} + x + C$$

4.
$$\frac{3}{4}(x^2 + 2x + 7)^{\frac{2}{3}} + C$$

5.
$$-\frac{1}{8}\cos(4x) + C, \quad \text{or} \quad \sin^2(2x) + C$$

It is equivalent, but you don't need to worry about that.

6.
$$\frac{\sin^5 x}{5} + C$$

7.
$$\frac{\tan^3 x}{3} + C$$

8.
$$\frac{1}{2}\arctan^2(x)$$

9.
$$\log(x^2 + 1)$$

10.
$$-\log(cos(x))$$

11.
$$\log(5^{3x} + 7)\frac{1}{3}$$

12.
$$\log(\log(x))$$

13.
$$\log(sin(x)) - \log(\cos(x))$$

14.
$$x + \log(x)$$

15.
$$x + 6\log(x - 5)$$

16.
$$\frac{5}{2}\log(x^2 + 1) + 3x - 3\arctan(x)$$

17.
$$\frac{1}{2}e^{2x+2}$$

18.
$$\frac{5^x}{\log(5)}$$

19.
$$\frac{10^x}{\log(10)}$$

20.
$$\frac{8^{3x+1}}{\log 8^3}$$

21.
$$x$$

$$3$$

22.

$$e^{\sin(x)}$$

23.

$$e^{\arcsin(x)}$$

24.

$$3x + \cos(x)$$