Wiskundeplan

Rekenvaardigheden: Afgeleiden (met Euler notatie)

(Versie 2025/02/26.54)

Inhoudsopgave

1.0.A Oefeningen niveau 1

Oefening 1.0.1. Bereken de afgeleide van volgende veeltermen

1. $(1)' = 0$
2. $(x)' = 1$
3. $\left(x^2\right)' = 2x$
4. $\left(x^3\right)' = 3x^2$
5. $\left(x^4\right)' = 4x^3$
6. $\left(x^5\right)' = 5x^4$

Oefening 1.0.2. Bereken de afgeleide van volgende veeltermen

1. $(x+1)' = 1$
2. $(x+2)' = 1$
3. $(x+3)' = 1$
4. $(2x+1)' = 2$
5. $(2x+2)' = 2$
6. $(2x+3)' = 2$
7. $(3x+1)' = 3$

Oefening 1.0.3. Bereken de afgeleide van volgende veeltermen

1. $\left(x^2+1\right)' = 2x$
2. $\left(x^2+2\right)' = 2x$
3. $\left(x^2+x\right)' = 2x+1$
4. $\left(x^2+2x\right)' = 2x+2$
5. $\left(x^2+x+1\right)' = 2x+1$
6. $\left(x^2+x+2\right)' = 2x+1$

Oefening 1.0.4. Bereken de afgeleide van volgende veeltermen

1. $\left(2x^2\right)' = 4x$
2. $\left(2x^2+1\right)' = 4x$
3. $\left(2x^2+x\right)' = 4x+1$
4. $\left(2x^2+x+1\right)' = 4x+1$
5. $\left(2x^2+2x+1\right)' = 4x+2$
6. $\left(2x^2+\pi x+1\right)' = 4x+\pi$

1.0.B Oefeningen niveau 2

Oefening 1.0.5. Bereken de afgeleide van volgende veeltermen

1. $\left(4x^3+2x^2+7x+5\right)' = 12x^2+4x+7$
2. $\left(-3x^3+5x^2-2x+8\right)' = -9x^2+10x-2$
3. $\left(7x^3-4x^2+x-6\right)' = 21x^2-8x+1$
4. $\left(x^3+3x^2+5x+7\right)' = 3x^2+6x+5$
5. $\left(-2x^3+6x^2-4x+10\right)' = -6x^2+12x-4$
6. $\left(5x^3-x^2+2x+9\right)' = 15x^2-2x+2$
7. $\left(-x^3+4x^2-7x+3\right)' = -3x^2+8x-7$
8. $\left(2x^3+x^2-5x+4\right)' = 6x^2+2x-5$
9. $\left(-4x^3+3x^2-x+6\right)' = -12x^2+6x-1$
10. $\left(3x^3-2x^2+8x-5\right)' = 9x^2-4x+8$

Oefening 1.0.6. Bereken de afgeleide van volgende veeltermen

1. $\left(4x^4+3x^3+2x^2+x+5\right)' = 16x^3+9x^2+4x+1$
2. $\left(-2x^4+5x^3-7x^2+4x-6\right)' = -8x^3+15x^2-14x+4$
3. $\left(x^4-2x^3+3x^2-4x+5\right)' = 4x^3-6x^2+6x-4$
4. $\left(6x^4-3x^3+x^2-2x+7\right)' = 24x^3-9x^2+2x-2$
5. $\left(-x^4+4x^3-5x^2+2x-8\right)' = -4x^3+12x^2-10x+2$
6. $\left(3x^4-x^3+6x^2-2x+9\right)' = 12x^3-3x^2+12x-2$
7. $\left(-5x^4+2x^3-x^2+3x-4\right)' = -20x^3+6x^2-2x+3$
8. $\left(2x^4-3x^3+5x^2-x+6\right)' = 8x^3-9x^2+10x-1$
9. $\left(-4x^4+x^3-2x^2+7x-3\right)' = -16x^3+3x^2-4x+7$
10. $\left(x^4+2x^3-4x^2+6x-5\right)' = 4x^3+6x^2-8x+6$

Oefening 1.0.7. Bereken de afgeleide van volgende veeltermen

1. $\left(4x^5+3x^4+2x^3+x^2+5x+7\right)' = 20x^4+12x^3+6x^2+2x+5$
2. $\left(-2x^5+5x^4-7x^3+4x^2-6x+3\right)' = -10x^4+20x^3-21x^2+8x-6$
3. $\left(x^5-2x^4+3x^3-4x^2+5x-6\right)' = 5x^4-8x^3+9x^2-8x+5$
4. $\left(6x^5-3x^4+x^3-2x^2+7x-8\right)' = 30x^4-12x^3+3x^2-4x+7$

1.0.B Oefeningen niveau 2

5. $\left(-x^5+4x^4-5x^3+2x^2-8x+9\right)' = -5x^4+16x^3-15x^2+4x-8$

6. $\left(3x^5-x^4+6x^3-2x^2+9x-4\right)' = 15x^4-4x^3+18x^2-4x+9$

7. $\left(-5x^5+2x^4-x^3+3x^2-4x+6\right)' = -25x^4+8x^3-3x^2+6x-4$

8. $\left(2x^5-3x^4+5x^3-x^2+6x-7\right)' = 10x^4-12x^3+15x^2-2x+6$

9. $\left(-4x^5+x^4-2x^3+7x^2-3x+8\right)' = -20x^4+4x^3-6x^2+14x-3$

10. $\left(x^5+2x^4-4x^3+6x^2-5x+9\right)' = 5x^4+8x^3-12x^2+12x-5$

1.0.C Oefeningen niveau 3

Oefening 1.0.8.

1. $\left(4x^2+6\right)' = 8x$
2. $\left(5x^3+7x-6\right)' = 15x^2+7$
3. $\left(5x^4-7x\right)' = 20x^3-7$
4. $\left(-2x^3+x^2+4\right)' = -6x^2+2x$
5. $\left(5x^4-x+8\right)' = 20x^3-1$
6. $\left(-x^5+3x^4+2x^2-6x+9\right)' = -5x^4+12x^3+4x-6$
7. $\left(6x^3+5x-7\right)' = 18x^2+5$
8. $\left(x^4+2x^3-5\right)' = 4x^3+6x^2$
9. $\left(7x^2-3x+2\right)' = 14x-3$
10. $\left(-4x^5+x^4-2x^3+6x^2-x+8\right)' = -20x^4+4x^3-6x^2+12x-1$

Oefening 1.0.9.

1. $\left(3x^3+5x-7\right)' = 9x^2+5$
2. $\left(-4x^4+x^3+2x-6\right)' = -16x^3+3x^2+2$
3. $\left(5x^5-7x^2+x-8\right)' = 25x^4-14x+1$
4. $\left(x^6-2x^5+3x^4-4x^3+7\right)' = 6x^5-10x^4+12x^3-12x^2$
5. $\left(-2x^3+4x^2-x+9\right)' = -6x^2+8x-1$
6. $\left(6x^4+5x^2-2x+8\right)' = 24x^3+10x-2$
7. $\left(-3x^5-7x^3+x^2+6\right)' = -15x^4-21x^2+2x$
8. $\left(4x^6-x^5+2x^4-3x^3+7x^2-x+9\right)' = 24x^5-5x^4+8x^3-9x^2+14x-1$
9. $\left(-x^4+2x-4\right)' = -4x^3+2$
10. $\left(2x^6+x^4-7x^3+5x^2-x+4\right)' = 12x^5+4x^3-21x^2+10x-1$

Oefening 1.0.10.

1. $\left(5x^3-2x^2+4x-7\right)' = 15x^2-4x+4$
2. $\left(-3x^4+2x-6\right)' = -12x^3+2$
3. $\left(7x^5+2x^3-8x^2+x-9\right)' = 35x^4+6x^2-16x+1$
4. $\left(x^6+2x^2-x+8\right)' = 6x^5+4x-1$

1.0.C Oefeningen niveau 3

5. $\left(-2x^3+6x^2-x+5\right)' = -6x^2+12x-1$
6. $\left(4x^4-x^3+3x^2-2x+7\right)' = 16x^3-3x^2+6x-2$
7. $\left(-5x^5-8x^3-6x+4\right)' = -25x^4-24x^2-6$
8. $\left(3x^6-4x^5+2x^2-x+9\right)' = 18x^5-20x^4+4x-1$
9. $\left(x^3+2x^2-4x+6\right)' = 3x^2+4x-4$
10. $\left(-2x^4+3x^3-5x^2+7x-8\right)' = -8x^3+9x^2-10x+7$

Oefening 1.0.11.

1. $\left(6x^5+8x-7\right)' = 30x^4+8$
2. $\left(-x^6+7x^3-4x^2+x-9\right)' = -6x^5+21x^2-8x+1$
3. $\left(5x^3-x^2+7x\right)' = 15x^2-2x+7$
4. $\left(-4x^4+2x^3-3x^2+6x\right)' = -16x^3+6x^2-6x+6$
5. $\left(7x^5-3x^4-8x^2+2x\right)' = 35x^4-12x^3-16x+2$
6. $\left(x^6-4x^5+2x^4-6x^3+5x^2-x\right)' = 6x^5-20x^4+8x^3-18x^2+10x-1$
7. $\left(-3x^3-2x\right)' = -9x^2-2$
8. $\left(4x^4-x^3+2x^2-5x\right)' = 16x^3-3x^2+4x-5$
9. $\left(-2x^5-6x\right)' = -10x^4-6$
10. $\left(3x^6+4x^4-7x^3+2x^2-x\right)' = 18x^5+16x^3-21x^2+4x-1$

2.0.D Oefeningen niveau 1

Oefening 2.0.12. Bereken de afgeleide

1. $(\sin x)' = \cos x$
2. $(\cos x)' = -\sin x$
3. $(-\sin x)' = -\cos x$
4. $(-\cos x)' = \sin x$
5. $(2\sin x)' = 2\cos x$
6. $(6\cos x)' = -6\sin x$
7. $(-\pi \sin x)' = -\pi \cos x$
8. $(-4\cos x)' = 4\sin x$

Oefening 2.0.13. Bereken de afgeleide

1. $(\sin x + \cos x)' = \cos x - \sin x$
2. $(\sin x \cdot \cos x)' = \cos^2 x - \sin^2 x$
3. $\left(\dfrac{\sin x}{\cos x}\right)' = \sec^2 x$
4. $\left(\dfrac{\cos x}{\sin x}\right)' = -\csc^2 x$
5. $\left(\sin^2(x)\right)' = 2\sin x \cos x$
6. $(\sin(2x))' = 2\cos(2x)$
7. $\left(\dfrac{1}{\sin x}\right)' = -\csc x \cot x$
8. $\left(\dfrac{1}{\cos x}\right)' = \sec x \tan x$

Oefening 2.0.14. Bereken de afgeleide

1. $\left(3\sin^2 x\right)' = 6\sin x \cos x$
2. $\left(3\cos^2 x\right)' = -6\cos x \sin x$
3. $(\cos(\sin x))' = -\sin(\sin x)\cos x$
4. $(\sin(\cos x))' = -\cos(\cos x)\sin x$
5. $(\cos(\cos x))' = \sin(\cos x)\sin x$
6. $(\tan(3x+1))' = 3\sec^2(3x+1)$
7. $(\sin(2x)\cdot\sin x)' = \cos(2x)\cdot\sin x + \sin(2x)\cdot\cos x$
8. $\left(\cos(x^2)\cdot\tan(x^2)\right)' = -2x\sin(x^2)\tan(x^2) + 2x\cos(x^2)\sec^2(x^2)$

2.0.E Oefeningen niveau 2

2.0.E Oefeningen niveau 2

Oefening 2.0.15. Bereken de afgeleide

1. $\left(\tan^2 x\right)' = 2\tan x \cdot \dfrac{1}{\cos^2 x}$
2. $\left(\sin^3 x\right)' = 3\sin^2 x \cos x$
3. $\left(\cos^3 x\right)' = -3\cos^2 x \sin x$
4. $\left(\dfrac{1}{\tan x}\right)' = -\dfrac{1}{\sin^2 x}$
5. $\left(\dfrac{1}{\sin^2 x}\right)' = -2\cos x \sin^{-3} x$
6. $\left(\dfrac{1}{\cos^2 x}\right)' = 2\sin x \cos^{-3} x$
7. $(\tan(2x))' = 2\sec^2(2x)$
8. $\left(\tan(x^2)\right)' = \dfrac{2x}{\cos^2(x^2)}$
9. $(\sin(3x)\cdot\cos(3x))' = 3\cos(6x)$
10. $(\cos(2x)\cdot\tan(2x))' = 2\sin(2x) + 2\cos^2(2x)/\cos^2(2x)$

Oefening 2.0.16. Bereken de afgeleide

1. $\left(\sin(x^2)\cdot\cos(x)\right)' = 2x\cos(x^2)\cos(x) - \sin(x^2)\sin(x)$
2. $\left(\sin(x^4+2)\right)' = 4x^3\cos(x^4+2)$
3. $(\pi + \cos x)' = -\sin x$
4. $(\cos x + \pi - sinx)' = -\cos x - \sin x$
5. $\left(\dfrac{\tan(3x^2)}{\sin(3x^2)}\right)' = \dfrac{6x\sin(3x^2)}{\cos^2(3x^2)}$
6. $\left(\cos^3(2x)\right)' = -6\cos^2(2x)\sin(2x)$
7. $\left((sinx + cosx)^3\right)' = 3(\sin x + \cos x)^2(\cos x - \sin x)$
8. $(sin\pi)' = 0$

Oefening 2.0.17. Bereken de afgeleide

1. $(\sin(4x+1))' = 4\cos(4x+1)$
2. $(\cos(5x-3))' = -5\sin(5x-3)$
3. $(\sin(\cos x))' = -\cos(\cos x)\sin x$
4. $(\cos(\sin x))' = -\sin(\sin x)\cos x$
5. $(\tan(\tan x))' = \dfrac{1}{\cos^2 x}\cdot\dfrac{1}{\cos^2(\tan x)}$

2.0.E Oefeningen niveau 2

6. $\left(\sin^2(\cos x)\right)' = -2\cos(\cos x)\sin(\cos x)\sin x$
7. $\left(\cos^2(\sin x)\right)' = -2\sin(\sin x)\cos(\sin x)\cos x$
8. $(x\sin x)' = \sin x + x\cos x$
9. $(x\cos x)' = \cos x - x\sin x$
10. $(x\tan x)' = \tan x + x\sec^2 x$

Oefening 2.0.18. Bereken de afgeleide

1. $\left(\sin x + x^2\right)' = \cos x + 2x$
2. $\left(\cos x + x^3\right)' = -\sin x + 3x^2$
3. $\left(\sin^2 x + x^4\right)' = 2\sin x\cos x + 4x^3$
4. $\left(\cos^2 x + x^5\right)' = -2\sin x\cos x + 5x^4$
5. $\left(x\sin^2 x\right)' = \sin 2x + 2x\sin x\cos x$
6. $\left(x\cos^2 x\right)' = -\sin 2x + 2x\cos x\sin x$
7. $\left(\sin(2x) + x^2\right)' = 2\cos(2x) + 2x$
8. $\left(\cos(3x) + x^3\right)' = -3\sin(3x) + 3x^2$
9. $\left(\tan(x^2+1)\right)' = \dfrac{2x}{\cos^2(x^2+1)}$
10. $\left(\sin^2(3x)\right)' = 6\sin(3x)\cos(3x)$

Oefening 2.0.19. Bereken de afgeleide

1. $\left(\cos^2(4x)\right)' = -8\sin(4x)\cos(4x)$
2. $\left(\sin(x)\cdot\cos(x^2)\right)' = \cos x\cos(x^2) - 2x\sin x\sin(x^2)$
3. $\left(\sin(x^2)\cdot\cos x\right)' = 2x\cos(x^2)\cos x - \sin(x^2)\sin x$
4. $\left(\sin(\cos(x^2))\right)' = -2x\sin x\cos(\cos(x^2))$
5. $\left(\cos(\sin(x^3))\right)' = -3x^2\cos x\sin(\sin(x^3))$
6. $\left(x^2\sin x\right)' = 2x\sin x + x^2\cos x$
7. $\left(x^3\cos x\right)' = 3x^2\cos x - x^3\sin x$
8. $\left(x^4\sin(2x)\right)' = 4x^3\sin(2x) + 2x^4\cos(2x)$
9. $\left(x^5\cos(3x)\right)' = 5x^4\cos(3x) - 3x^5\sin(3x)$
10. $\left(\dfrac{x^2}{\sin x}\right)' = \dfrac{2x\sin x - x^2\cos x}{\sin^2 x}$

2.0.E Oefeningen niveau 2

Oefening 2.0.20. Bereken de afgeleide

1. $\left(\frac{\tan x}{x}\right)' = \frac{x\sec^2 x - \tan x}{x^2}$
2. $\left(\frac{x^3}{\cos x}\right)' = \frac{3x^2\cos x + x^3\sin x}{\cos^2 x}$
3. $\left(\frac{x}{\sin x}\right)' = \frac{\sin x - x\cos x}{\sin^2 x}$
4. $\left(\frac{x^2}{\cos x}\right)' = \frac{2x\cos x + x^2\sin x}{\cos^2 x}$
5. $\left(\frac{x^3}{\sin x}\right)' = \frac{3x^2\sin x - x^3\cos x}{\sin^2 x}$
6. $\left(\frac{x}{\cos x}\right)' = \frac{\cos x + x\sin x}{\cos^2 x}$
7. $\left(\frac{x^4}{\sin(2x)}\right)' = \frac{4x^3\sin(2x) - 2x^4\cos(2x)}{\sin^2(2x)}$
8. $\left(\frac{x^5}{\cos(2x)}\right)' = \frac{5x^4\cos(2x) + 2x^5\sin(2x)}{\cos^2(2x)}$
9. $\left(\tan(x^3+x)\right)' = \frac{(3x^2+1)}{\cos^2(x^3+x)}$
10. $\left(x^2\sin(x^2+1)\right)' = 2x\sin(x^2+1) + 2x^3\cos(x^2+1)$

2.0.F Oefeningen niveau 3

Oefening 2.0.21. Bereken de afgeleide

1. $\left(\dfrac{x^6}{\sin(3x)}\right)' = \dfrac{6x^5\sin(3x) - 3x^6\cos(3x)}{\sin^2(3x)}$
2. $\left(x^3\cos(x^4+x)\right)' = 3x^2\cos(x^4+x) - x^3(4x^3+1)\sin(x^4+x)$
3. $\left(\tan(x^5+x^3)\right)' = \dfrac{(5x^4+3x^2)}{\cos^2(x^5+x^3)}$
4. $\left(\dfrac{x^4}{\cos(x^3+x)}\right)' = \dfrac{4x^3\cos(x^3+x) + (3x^2+1)x^4\sin(x^3+x)}{\cos^2(x^3+x)}$
5. $\left(x^2\sin(x^4+x^2)\right)' = 2x\sin(x^4+x^2) + x^2(4x^3+2x)\cos(x^4+x^2)$
6. $\left(\cos(x^2+\sin x)\right)' = -(2x+\cos x)\sin(x^2+\sin x)$
7. $\left(\sin^3(x^2+2x)\right)' = 3\sin^2(x^2+2x)\cos(x^2+2x)(2x+2)$
8. $\left(x^3\cos^2(x^2)\right)' = 3x^2\cos^2(x^2) - 2x^3\cos(x^2)\sin(x^2)\cdot 2x$
9. $\left(\dfrac{x^5}{\sin^2(2x)}\right)' = \dfrac{5x^4\sin^2(2x) - 4x^5\sin(2x)\cos(2x)}{\sin^4(2x)}$
10. $\left(\tan^2(x^3+x)\right)' = 2\tan(x^3+x)\cdot\dfrac{(3x^2+1)}{\cos^2(x^3+x)}$

3.0.G Oefeningen niveau 1

Oefening 3.0.22. Bereken de afgeleide

1. $(e^x)' = e^x$
2. $(2e^x)' = 2e^x$
3. $(3e^x)' = 3e^x$
4. $(e^x + 1)' = e^x$
5. $(e^x + 2)' = e^x$
6. $(e^x + e^x)' = 2e^x$
7. $(3e^x - 10e^x)' = -7e^x$
8. $(e^\pi)' = 0$
9. $(\pi e^x)' = \pi e^x$

Oefening 3.0.23. Bereken de afgeleide

1. $\left(e^2 x\right)' = 2e^{2x}$
2. $(e^{-x})' = -e^{-x}$
3. $\left(e^{x^2}\right)' = 2xe^{x^2}$
4. $(xe^x)' = (1 + x)e^x$
5. $\left(x^2 e^x\right)' = xe^x(2 + x)$
6. $\left(e^{2x+1}\right)' = 2e^{2x+1}$
7. $(e^\pi e^x)' = e^\pi e^x$
8. $\left(e^{\sin x}\right)' = \cos(x)e^x$
9. $\left(e^{\cos x}\right)' = -\sin(x)e^x$

Oefening 3.0.24.

1. $(\ln x)' = \frac{1}{x}$
2. $(\ln(2x))' = \frac{1}{x}$
3. $\left(\ln(x^2)\right)' = \frac{2}{x}$
4. $(\ln(3x + 1))' = \frac{3}{3x + 1}$
5. $\left(\ln(x^3 + 4)\right)' = \frac{3x^2}{x^3 + 4}$
6. $(x \ln x)' = \ln x + 1$
7. $\left(x^2 \ln x\right)' = 2x \ln x + x$
8. $(\ln(\sin x))' = \frac{\cos x}{\sin x}$
9. $\left(\ln(x^2 + 1)\right)' = \frac{2x}{x^2 + 1}$
10. $(\ln(e^x))' = 1$

3.0.H Oefeningen niveau 2

Oefening 3.0.25. Bereken de afgeleide

1. $\left(e^{3x}\right)' = 3e^{3x}$
2. $\left(e^{-2x}\right)' = -2e^{-2x}$
3. $\left(e^{x^3}\right)' = 3x^2e^{x^3}$
4. $\left(xe^{x^2}\right)' = e^{x^2}(1+2x^2)$
5. $\left(x^3e^x\right)' = e^x x^2(3+x)$
6. $\left(e^{3x+5}\right)' = 3e^{3x+5}$
7. $(e^x + e^{-x})' = e^x - e^{-x}$
8. $\left(e^{\sin(2x)}\right)' = 2\cos(2x)e^{\sin(2x)}$
9. $\left(e^{\cos(3x)}\right)' = -3\sin(3x)e^{\cos(3x)}$
10. $\left(e^{x^4+x}\right)' = (4x^3+1)e^{x^4+x}$

Oefening 3.0.26. Bereken de afgeleide

1. $(e^x \cdot e^x)' = 2e^x e^x$
2. $\left(e^{x+e^x}\right)' = (1+e^x)e^{x+e^x}$
3. $\left(xe^{x^3}\right)' = e^{x^3}(1+3x^3)$
4. $\left(e^{x^2+4x}\right)' = (2x+4)e^{x^2+4x}$
5. $\left(xe^{2x}\right)' = e^{2x}(1+2x)$
6. $\left(e^{\tan x}\right)' = \sec^2 x \cdot e^{\tan x}$
7. $\left(e^{\ln x}\right)' = \frac{1}{x}e^{\ln x}$
8. $\left(e^{x^3+x^2}\right)' = (3x^2+2x)e^{x^3+x^2}$
9. $\left(x^2e^{x^2}\right)' = e^{x^2}x(2+x^2)$
10. $\left(xe^{x+1}\right)' = e^{x+1}(1+x)$

Oefening 3.0.27. Bereken de afgeleide

1. $e^{\cos^2 x} = -2\sin x\cos x e^{\cos^2 x}$
2. $e^{\sin^2 x} = 2\sin x\cos x e^{\sin^2 x}$
3. $e^{x+e^x} = (1+e^x)e^{x+e^x}$
4. $x^3e^{x^2} = e^{x^2}x^2(3+2x^2)$
5. $e^{\tan^2 x} = 2\tan x\sec^2 x e^{\tan^2 x}$
6. $xe^{x^4} = e^{x^4}(1+4x^4)$
7. $e^{\ln(x^2)} = \frac{2}{x}e^{\ln(x^2)}$
8. $e^{\cos(x^2)} = -2x\sin(x^2)e^{\cos(x^2)}$
9. $e^{x+e^{x^2}} = (1+2xe^{x^2})e^{x+e^{x^2}}$
10. $e^{\sin(x^3)} = 3x^2\cos(x^3)e^{\sin(x^3)}$