19te Mathe HÜ am 01.12.22 — Steven Vlajic

Bsps) (4.120a-c), 4.121a), 4.126a), 4.127a)

4.120a) $f(x) = \frac{2x}{x^3-7}$ $u = 2x$ $u' = 2$ $v = x^3-7$ $v' = 3x^2$

$f'(x) = \frac{2\cdot(x^3-7) - 3x^2 \cdot 2x}{(x^3-7)^2} = \frac{2x^3-14-6x^3}{(x^3-7)^2} = \frac{-4x^3-14}{(x^3-7)^2} = f'(x)$

b) $y = \frac{2x^2-5x}{x^3-3}$ $u = 2x^2-5x$ $u' = 4x-5$ $v = x^3-3$ $v' = 3x^2$

$f'(x) = \frac{(4x-5)\cdot(x^3-3) - 3x^2\cdot(2x^2-5x)}{(x^3-3)^2} = \frac{4x^4-12x-5x^3+15-6x^4+15x^3}{(x^3-3)^2}$

$f'(x) = \frac{-2x^4+10x^3-12x+15}{(x^3-3)^2}$

c) $f(x) = \frac{x^3-5x^2}{x^2-7}$ $u = x^3-5x^2$ $u' = 3x^2-10x$ $v = x^2-7$ $v' = 2x$

$f'(x) = \frac{(3x^2-10x)\cdot(x^2-7) - 2x\cdot(x^3-5x^2)}{(x^2-7)^2} = \frac{3x^4-21x^2-10x^3+70x-2x^4+10x^3}{(x^2-7)^2}$

$f'(x) = \frac{x^4-21x^2+70x}{(x^2-7)^2}$

4.121a) $y = \frac{2x^5}{e^x}$ $u = 2x^5$ $u' = 10x^4$ $v = e^x$ $v' = e^x$ $y' = \frac{10x^4e^x - e^x 2x^5}{e^{2x}}$

$f'(x) = \frac{10x^4-2x^5}{e^x}$

4.121b) $f(x) = \frac{e^x+1}{2e^x-1}$ $u = e^x+1$ $u' = e^x$ $v = 2e^x-1$ $v' = 2e^x$

$f'(x) = \frac{2e^{2x} - e^x - 2e^{2x} - 2e^x}{(2e^x-1)^2}$

$f'(x) = -\frac{3e^x}{(2e^x-1)^2}$

4.126a) $y = \frac{\cos(x)-\sin(x)}{\cos(x)\cdot\sin(x)}$

$u = \cos(x)-\sin(x)$ $u' = -\sin(x)-\cos(x)$

$v = \cos(x)\cdot\sin(x)$ $v' = \cos^2(x)+\sin^2(x)$

$a' = \sin(x)$, $b' = \cos(x)$

$f'(x) = \frac{[-\sin(x)-\cos(x)]\cdot\cos(x)\cdot\sin(x) - (\cos^2(x)+\sin^2(x))\cdot(\cos(x)-\sin(x))}{\cos^2(x)\cdot\sin^2(x)}$

$f'(x) = -\cos(x)\sin^2(x) - \cos^2(x)\cdot\sin(x) - \cos^3(x) + \sin(x)\cdot\cos^2(x) - \sin^3(x) + \sin^2(x)\cdot\cos(x)$

$f(x) = \frac{-\cos^3(x)-\sin^3(x)}{\cos^2(x)\cdot\sin^2(x)}$

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4.127/3)

~~1) Produktregel~~

2) Potenzregel

3) Quotientenregel

$$f(t) = t^2 \cdot \frac{1}{\sin(x)}$$

$$f'(t) = \frac{2t \cdot \sin(x) - \cos(x) \cdot t^2}{\sin^2}$$

$u = t^2 \quad u' = 2t$

$v = \frac{1}{\sin(x)} \quad v' = \cos(x)$