Stevan Vugjić

16te Mathe HÜ am 21.11.22

4.59a) A: 5 Ableitungen → Funktion 5ten Grades

$y = x^5 - 3x^2$

$f'(x) = 5x^4 - 6x$

$f''(x) = 20x^3 - 6$

$f'''(x) = 60x^2$

$f^{(4)}(x) = 120x$

$f^{(5)}(x) = 120$

4.59c)

$f(t) = t^4 + 4t^3 - 6t$

$f'(x) = 4t^3 + 12t^2 - 6$

$f''(x) = 12t^2 + 24t$

$f'''(x) = 24t + 24$

$f^{(4)}(x) = 24$

A: 4 Ableitungen → Funktion 4ten Grades

4.61a)b)

a) $f(x) = 3x^2 - 2x + 1 \qquad x_0 = -1$

$f'(x) = 6x - 2 \qquad f'(-1) = -8$

b) $f(x) = \frac{\sqrt{x}}{4} + 3 \qquad x_0 = 25$

$f'(x) = \frac{1}{2} \cdot \frac{x^{-\frac{1}{2}}}{4} \qquad f'(25) = \frac{1}{40}$

4.62a) $g(t) = 2t^2 + 3t - \frac{1}{t}$; $t_0 = 3$

$g'(t) = 4t + 3 + 1t^{-2} \qquad g'(t) = 4t + 3 + \frac{1}{t^2} \qquad g'(3) = \frac{136}{9}$

4.63ab)

a) $s(t) = \frac{g}{2} \cdot t^2 \qquad t_0 = 3{,}8$

$u = \frac{g}{2} \qquad u' = \frac{1}{2}$

$v = t^2 \qquad v' = 2t$

$s'(t) = g \cdot t \quad : \quad s'(3{,}8) = 3{,}8 \cdot \overset{9{,}81}{g} = 37{,}28$

b) $M(x) = q \cdot l \cdot \frac{x}{2} - q\frac{x^2}{2} \qquad x_0 = \frac{l}{2}$

$M'(x) = \frac{ql}{2} - \frac{2qx}{2} \qquad f'\left(\frac{l}{2}\right) = \frac{q \cdot l}{2} - \frac{\cancel{2} \cdot q \cdot \frac{l}{2}}{\cancel{2}} = 0$ (a)

4.101a)

$f(x) = 2x \cdot \cos(x) \qquad u = 2x \qquad u' = 2$

$v = \cos(x) \qquad v' = -\sin(x)$

$f'(x) = 2 \cdot \cos(x) + -\sin(x) \cdot 2x \quad : \quad f'(x) = 2 \cdot \cos(x) - 2x\sin(x)$

b) $f(x) = 4x^3 \cdot \sin(x) \qquad u = 4x^3 \qquad u' = 12x^2$

$v = \sin(x) \qquad v' = \cos(x)$

$f'(x) = 12x^2 \cdot \sin(x) + \cos(x) \cdot 4x^3$ (b)

Stevan Vlajic

16te Mathe HÜ am 24.11.22. (weiter)

4.107c) $f(x) = 3x^4 \cdot \sin(x)$

$u = 3x^4 \quad u' = 12x^3$

$v = \sin(x) \quad v' = \cos(x)$

$f'(x) = 12x^3 \cdot \sin(x) + \cos(x) \cdot 3x^4$

$\underline{\underline{f'(x) = 3x^4 \cdot \cos(x) + 12x^3 \cdot \sin(x)}}$

d) $y = x^2 \cdot \cos(x)$

$u = x^2 \quad u' = 2x$

$v = \cos(x) \quad v' = -\sin(x)$

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

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