18 HÜ am 29.11.22 Stevan Vlajić

4.112) a-c) | 4.114 a-c)

4.112 a) $f(x) = (3-x) \cdot e^x$ $\quad u = 3-x \quad u' = 1$ $\quad v = e^x \quad v' = e^x$

$f'(x) = 1e^x + e^x(3-x)$

$f'(x) = e^x(1 + (3-x))$

4.112 b) $f(t) = \frac{R}{L} \cdot t \cdot (1-e^t)$ $\quad u = \frac{R}{L} \cdot t \quad u' = \frac{R}{L}$ $\quad v = (1-e^t) \quad v' = -e^t$

$f'(t) = \frac{R}{L} \cdot (1-e^t) - e^t\left(\frac{R}{L} \cdot t\right)$

$f'(t) = \frac{R}{L}(1 - e^t - e^t t)$

$f(x)' = u' \cdot v + v' \cdot u$

$a = \frac{R}{L}$ $\quad a' = 0$

$b = t \quad b' = 1 \quad U' = \frac{R}{L}$

4.112 c)

$f(x) = 2 \cdot \sqrt[5]{x} \cdot (x^3 - \cos(x))$ $\quad u = 2 \cdot \sqrt[5]{x}$

$v = (x^3 - \cos(x)) \quad v' = 3x^2 + \sin(x)$

$f'(x) = \frac{2 \cdot (x^3 - \cos(x))}{5 \cdot \sqrt[5]{x^4}(-\cos(x))} + (3x + \sin(x)) \cdot (2 \cdot \sqrt[5]{x})$

$a = 2 \quad a' = 0$

$b = \sqrt[5]{x} = x^{\frac{1}{5}} \quad b' = \frac{1}{5\sqrt[5]{x^4}}$

$f'(x) = \frac{2 \cdot (x^3 - \cos(x)) + 3x^2 + \sin(x) \cdot x}{5 \cdot \sqrt[5]{x^3}}$

$v = \frac{2}{5\sqrt[5]{x^4}}$

$f'(x) = \frac{2x^3 - 2\cos(x) + (30x^2 + 10 \cdot \sin(x)) \cdot x}{5\sqrt[5]{x^4}}$

$f'(x) = \frac{32x^3 - 2\cos(x) + 10x \cdot \sin(x)}{5\sqrt[5]{x^4}}$

18te Mathe Hü am 29.11.22 Steven Klasji

Lösungen

4.114a-c)

4.114a)

$f(x) = \underbrace{x^2 \cdot \sin(x)}_{u} \cdot \underbrace{\cos(x)}_{v}$

$u = x^2 \cdot \sin(x)$

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

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

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

~~$u' = 2x \cdot \cos$~~

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

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

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

b) $y = \sqrt{x} \cdot (x^2+3) \cdot e^x$

$u = \sqrt{x} \cdot (x^2+3)$

$v = e^x \quad v' = e^x$

$a' = \frac{1}{2\sqrt{x}} \quad b' = 2x$

$a = \sqrt{x} \quad b = (x^2+3)$

$u' = \frac{1}{2\sqrt{x}} \cdot (x^2+3) + 2x \cdot \sqrt{x}$

$u' = \frac{5x^2+3}{2\sqrt{x}}$

$f'(x) = \frac{(5x^2+3)e^x}{2\sqrt{x}} + e^x \cdot (\sqrt{x} \cdot (x^2+3))$

$f'(x) = \frac{5x^2e^x + 3e^x + 2x^3e^x + 6xe^x}{2\sqrt{x}}$

$f'(x) = \frac{e^x(5x^2+3+2x^3+6x)}{2\sqrt{x}}$

c) $f(t) = t \cdot \ln(t) \cdot 2^t$

$u = t \cdot \ln(t)$

$v = 2^t \quad v' = \ln(2) \cdot 2^t$

$a = t \quad a' = 1$

$b = \ln(t) \quad b' = \frac{1}{t}$

$u' = \ln(t) + 1$

$f'(t) = (\ln(t)+1) \cdot 2t + \ln(2) \cdot 2t \cdot t \cdot \ln(t)$

$f'(t) = 2t\ln(t) + 2t + 2t^2\ln(2)\ln(t) \rightarrow f'(1) = 2t(\ln(t) + 1 + t\ln(t)\ln(2))$