3.te Mathe HÜ am 12.03.2023 6-1c)c) Stevan Vlajić

c) $\int x \cdot \ln(x)\, dx$

$u = \ln(x) \quad u' = \frac{1}{x}$

$v' = x \quad v = \frac{x^2}{2}$

$\frac{\ln(x) \cdot x^2}{2} - \left(\int \frac{1}{x} \cdot \frac{x^2}{2}\, dx\right)$

$\int \frac{x}{2}\, dx = \frac{x^2}{4}$

$\frac{\ln(x) \cdot x^2}{2} - \frac{x^2}{4} + C$

d) $\int t \cdot 3^t\, dt$

$u = t \quad u' = 1$

$v' = 3^t \quad v = \frac{3^t}{\ln(3)}$

$\frac{t \cdot 3^t}{\ln(3)} - \int \frac{3^t}{\ln(3)}\, dt = \frac{t \cdot 3^t}{\ln(3)} - \frac{1}{\ln(3)} \left(\int 3^t\, dt\right)$

$\int 3^t\, dt = \frac{3^t}{\ln(3)}$

$\frac{t \cdot 3^t}{\ln(3)} - \frac{3^t}{\ln^2(3)} + C$

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6. 1a) c)

a) $\int x^2 \cdot \sin(x)\, dx$

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

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

$x^2 \cdot (-\cos(x)) - \int -\cos(x) \cdot 2x\, dx$

$x^2 \cdot (-\cos(x)) + 2\int \cos(x) \cdot x\, dx$

$u = x \quad u' = 1$

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

$x^2 \cdot (-\cos(x)) + 2 \cdot \left(x \cdot \sin(x) - \int \sin(x)\, dx\right)$ ($\int \sin(x)\,dx$: $-\cos$)

$-x^2 \cdot \cos(x) + 2x \cdot \sin(x) + 2 \cdot \cos(x) + C$

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c) $\int t^2 \cdot \ln(t)\, dt$

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

$v' = t^2 \quad v = \frac{t^3}{3}$

$\frac{\ln(t) \cdot t^3}{3} - \int \frac{1}{t} \cdot \frac{t^3}{3}\, dt = \frac{\ln(t) \cdot t^3}{3} - \frac{t^3}{9} + C$

$\int \frac{t^2}{3}\, dt \rightarrow \frac{t^3}{9}$