S102 Nr. 13

a) $f(x) = (x+2)^2$; $F(x) = \frac{x^3}{3} + \frac{4x^2}{2} + 4x + C$

$f(x) = x^2 + 4x + 4$

$F(0) = 1 = \frac{0^3}{3} + \frac{4 \cdot 0^2}{2} + 4 \cdot 0 + C \Rightarrow C = 1$

I) $F(x) = \frac{x^3}{3} + 2x^2 + 4x + 1$

oder

$f(x) = (x+2)^2$; $F(x) = \frac{1}{3} \cdot (x+2)^3 \cdot \frac{1}{1} + C$

$F(0) = \frac{1}{3}(0+2)^3 + C = 1 \Rightarrow C = 1 - \frac{8}{3} = -\frac{5}{3}$

II) $F(x) = \frac{1}{3}(x+2)^3 - \frac{5}{3}$

Wende die Binomische Formel an und du erhältst aus II → I

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b) $f(x) = \frac{1}{x+1}$; $F(x) = \ln(|x+1|) \cdot \frac{1}{1} + C$

$F(0) = \underbrace{\ln(|0+1|)}_{=0} + C = 1 \Rightarrow C = 1$

$F(x) = \ln(|x+1|) + 1$

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c) $f(t) = 2 \cdot e^{0,5t}$; $F(t) = 2 \cdot e^{0,5t} \cdot \frac{1}{0,5} + C = 4 \cdot e^{0,5t} + C$

$F(0) = 4 \cdot e^{0,5 \cdot 0} + C = 1 \Rightarrow 4 + C = 1 \Rightarrow C = -3$

$F(t) = 4 \cdot e^{0,5 \cdot t} - 3$

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d) $f(t) = \cos(5t)$; $F(t) = \sin(5t) \cdot \frac{1}{5} + C = \frac{1}{5}\sin(5t) + C$

$F(0) = \frac{1}{5} \cdot \underbrace{\sin(5 \cdot 0)}_{=0} + C = 1 \Rightarrow C = 1$

$F(t) = \frac{1}{5}\sin(5 \cdot t) + 1$