1(a) $\int \operatorname{arctg}(x+3)\,dx = \int \underbrace{1}_{f'} \cdot \underbrace{\operatorname{arctg}(x+3)}_{g}\,dx =$ 1

$= x\operatorname{arctg}(x+3) - \int x \frac{1}{1+(x+3)^2}\,dx =$

$= x\operatorname{arctg}(x+3) - \frac{1}{2}\int \frac{2x}{x^2+6x+10}\,dx = x\operatorname{arctg}(x+3) -$

$- \frac{1}{2}\int \frac{(2x+6)-6}{x^2+6x+10}\,dx$ 2 $= x\operatorname{arctg}(x+3) - \frac{1}{2}\ln(x^2+6x+4)$

$+ 3\int \frac{1}{1+(x+3)^2}\,dx = x\operatorname{arctg}(x+3) - \frac{1}{2}\ln(x^2+6x+4) +$

$+ 3\operatorname{arctg}(x+3) + C = (x+3)\operatorname{arctg}(x+3) - \frac{1}{2}\ln(x^2+6x+4) + C$

na intervale $(-\infty, \infty)$. 2

skúška: $\left[(x+3)\operatorname{arctg}(x+3) - \frac{1}{2}\ln(x^2+6x+4) + C\right]' =$

$= \operatorname{arctg}(x+3) + \frac{x+3}{1+(x+3)^2} - \frac{1}{2}\,\frac{2x+6}{x^2+6x+10} =$

$= \operatorname{arctg}(x+3) + \frac{(x+3)-(x+3)}{x^2+6x+10} = \operatorname{arctg}(x+3)$ 2

na $(-\infty, \infty)$.

1(b) Vypočítajte $\int_1^{\infty} \frac{x}{(x+1)^2}\,dx$ ak existuje

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

$= \ln(x+1) + \frac{1}{x+1} + C$ pre $x \in (1, \infty)$

$\int_1^{\infty} \frac{x}{(x+1)^2}\,dx = \lim_{t\to\infty} \int_1^{t} \frac{x}{(x+1)^2}\,dx$ 1 $= \lim_{t\to\infty} \left[\ln(x+1) + \frac{1}{x+1}\right]_1^t =$

$= \lim_{t\to\infty} \left(\underbrace{\ln(t+1)}_{\to\infty} + \underbrace{\frac{1}{t+1}}_{\to 0} - \ln 2 - \frac{1}{2}\right) = \infty \Rightarrow$ neex. (nekonverguje) 2