$$= \frac{1}{2} \Big/_{0}^{t} \frac{1}{-1} \underbrace{(2x+3)^{-1}}_{\frac{1}{2x+3}} = -\frac{1}{2}\left(\frac{1}{2t+3} - \frac{1}{2\cdot 0+3} \right)$$

$$\xrightarrow{t\to\infty} -\frac{1}{2}\left(0 - \frac{1}{3}\right) = \underline{\frac{1}{6}} = I$$

10.4 a) $\int_0^1 \frac{1}{\sqrt{x}}\,dx = I$, $\frac{1}{\sqrt{x}}$ on jatkuva $]0,1]$

$$\int_t^1 \frac{1}{\sqrt{x}}\,dx = \int_t^1 x^{-\frac{1}{2}}\,dx = \Big/_{t}^{1} \frac{1}{\frac{1}{2}} x^{\frac{1}{2}} = \Big/_{t}^{1} 2\sqrt{x} = 2\sqrt{1} - 2\sqrt{t}$$

$$\xrightarrow{t\to 0+} 2\cdot 1 - 2\cdot 0 = \underline{2} = I$$

b) $\int_0^1 \frac{1}{x}\,dx = I$, $\frac{1}{x}$ jatkuva väl. $]0,1]$

$$\int_t^1 \frac{1}{x}\,dx = \Big/_{t}^{1} \ln|x| = \underbrace{\ln 1}_{=0} - \ln t \xrightarrow{t\to 0+} -\ln 0 = -(-\infty) = \infty$$

$$e^{-\infty} = \frac{1}{e^{\infty}} = 0$$

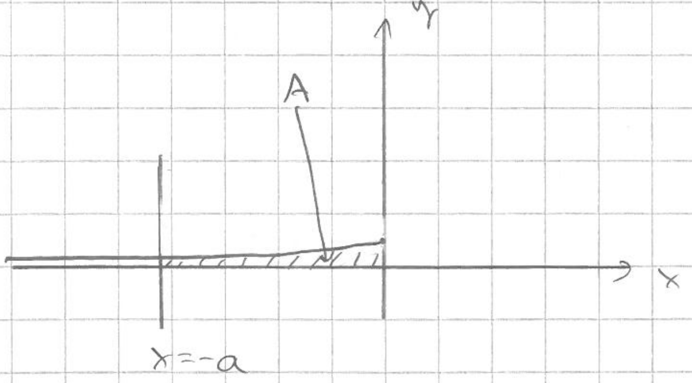
$\Rightarrow$ <u>I hajaantuu</u>

c) $\int_0^1 \frac{1}{x^2}\,dx = I$, $\frac{1}{x^2}$ jatkuva väl. $]0,1]$

$$\int_t^1 \frac{1}{x^2}\,dx = \int_t^1 x^{-2}\,dx = \Big/_{t}^{1} \frac{1}{-1}x^{-1} = \Big/_{t}^{1} -\frac{1}{x}$$

$$= -\frac{1}{1} + \frac{1}{t} \xrightarrow{t\to 0+} -1 + \infty = \infty \Rightarrow \underline{I \text{ hajaantuu}}$$

10.17 $y = \frac{1}{1+\underbrace{e^{-x}}_{>0}} > 0$



$$A = \int_{-a}^{0} \frac{1}{1+e^{-x}}\,dx$$

$$= \int_{-a}^{0} e^x) \frac{1}{1+\frac{1}{e^x}}\,dx = \int_{-a}^{0} \frac{1}{\frac{e^x+1}{e^x}}\,dx = \int_{-a}^{0} \frac{e^x}{e^x+1}\,dx$$

$$\frac{1}{e^a} \to \frac{1}{\infty} = 0$$

$$= \Big/_{-a}^{0} \ln(e^x+1) = \ln(\underbrace{e^0}_{=1}+1) - \ln(e^{-a}+1) = \underline{\ln 2 - \ln(e^{-a}+1)}$$

$$\xrightarrow{a\to\infty} \ln 2 - \underbrace{\ln(0+1)}_{=0} = \underline{\ln 2}$$