10.6 a) $\displaystyle\int_1^\infty \underbrace{\frac{3x^2}{x^3+5}}_{f(x)}\,dx = I$, f jatk. väl. $[1,\infty[$

$$\int_1^t \frac{3x^2}{x^3+5}\,dx = \Big/_{1}^{t} \ln|x^3+5| = \ln|t^3+5| - \ln|1^3+5|$$

$$\xrightarrow{t\to\infty} \ln\infty - \ln 6 = \infty - \ln 6 = \infty$$

$\Rightarrow$ I hajaantuu

b) $\displaystyle\int_0^\infty \underbrace{\frac{1}{(2x+3)^2}}_{f(x)}\,dx = I$, f jatk. väl. $[0,\infty[$

$$\int_0^t \frac{1}{(2x+3)^2}\,dx = \int_0^t (2x+3)^{-2}\,dx = \frac{1}{2}\int_0^t \underbrace{2}_{g'(x)}\underbrace{(2x+3)}_{g(x)}{}^{-2}\,dx$$

$$= \frac{1}{2}\Big/_{0}^{t} \frac{1}{-1}\underbrace{(2x+3)^{-1}}_{\frac{1}{2x+3}} = \frac{1}{2}\left[-\frac{1}{2t+3} - \left(-\frac{1}{2\cdot 0+3}\right)\right] \xrightarrow{t\to\infty} \frac{1}{2}\left[0+\frac{1}{3}\right] = \frac{1}{6} = I$$

10.4 a) $A = \displaystyle\int_0^1 \underbrace{\frac{1}{\sqrt{x}}}_{f(x)}\,dx$, f jatk. väl. $]0,1]$

$$\int_t^1 \frac{1}{\sqrt{x}}\,dx = \int_t^1 x^{-\frac{1}{2}}\,dx = \Big/_{t}^{1} \frac{1}{\frac{1}{2}}\underbrace{x^{\frac{1}{2}}}_{\sqrt{x}} = 2\sqrt{1} - 2\sqrt{t} \xrightarrow{t\to 0+} 2\cdot 1 - 2\cdot 0$$

$$= 2 = A$$

b) $A = \displaystyle\int_0^1 \underbrace{\frac{1}{x}}_{f(x)}\,dx$, f jatk. väl. $]0,1]$

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

$\Rightarrow$ A:lla ei ole arvoa (A on ∞:n iso)

c) $A = \displaystyle\int_0^1 \underbrace{\frac{1}{x^2}}_{f(x)}\,dx$, f jatk. väl. $]0,1]$

$$\int_t^1 \frac{1}{x^2}\,dx = \int_t^1 x^{-2}\,dx = \Big/_{t}^{1} \frac{1}{-1}\underbrace{x^{-1}}_{\frac{1}{x}} = -\frac{1}{1} - \left(-\frac{1}{t}\right)$$

$$= -1 + \frac{1}{t} \xrightarrow{t\to 0+} -1+\infty = \infty$$

$\Rightarrow$ A:lla ei ole arvoa (A on ∞:n iso)