II osa lk. 39 HARJUTUSÜLESANDED

Leia piirväärtused.

a) $\lim_{x\to\infty}\frac{3-2x-7x^2}{x^2+3x+2}=\lim_{x\to\infty}\frac{x^2\left(\frac{3}{x^2}-\frac{2}{x}-7\right)}{x^2\left(1+\frac{3}{x}+\frac{2}{x^2}\right)}=\frac{-7}{1}-7$

b) $\lim_{x\to\infty}\frac{\sqrt{x^2+4}}{x+2}=\lim_{x\to\infty}\frac{\sqrt{x^2\left(1+\frac{4}{x^2}\right)}}{x\left(1+\frac{2}{x}\right)}=\lim_{x\to\infty}\frac{x\cdot\sqrt{\left(1+\frac{4}{x^2}\right)}}{x\left(1+\frac{2}{x}\right)}=1$

c) $\lim_{x\to 2}\frac{x^2-x-2}{3x^2-5x-2}=\lim_{x\to 2}\frac{(x+1)(x-2)}{3(x-2)\left(x+\frac{1}{3}\right)}=\frac{2+1}{3\left(2+\frac{1}{3}\right)}=\frac{3}{7}$

d)

$\lim_{n\to\infty}\left(\frac{5n}{3n+2}-\frac{2n^2}{n^2+n-1}\right)=\lim_{n\to\infty}\left(\frac{5n}{3n+2}\right)-\lim_{n\to\infty}\left(\frac{2n^2}{n^2+n-1}\right)=$

$=\lim_{n\to\infty}\frac{5n}{n\left(3+\frac{2}{n}\right)}-\lim_{n\to\infty}\frac{2n^2}{n^2\left(1+\frac{1}{n}-1\right)}=\frac{5}{3}-2=-\frac{1}{3}$

e) $\lim_{x\to\infty}\frac{\sqrt{2x^2+1}}{x+3}=\lim_{x\to\infty}\frac{x\sqrt{2+\frac{1}{x^2}}}{x\left(1+\frac{3}{x}\right)}=\sqrt{2}$

f) $\lim_{x\to\infty}\frac{x^2-5x+6}{4-x-5x^2}=\lim_{x\to\infty}\frac{x^2\left(1-\frac{5}{x}+\frac{6}{x^2}\right)}{x^2\left(\frac{4}{x^2}-\frac{1}{x}-5\right)}=-\frac{1}{5}$

g) $\lim_{x\to 1}\frac{\sqrt{x}-1}{x-1}=\lim_{x\to 1}\frac{\sqrt{x}-1}{(\sqrt{x}-1)(\sqrt{x}+1)}=\lim_{x\to 1}\frac{1}{\sqrt{x}+1}=\frac{1}{2}$

h) $\lim_{n\to\infty}\left(\frac{n+3n^2}{1-n-n^2}-\frac{1}{n}\right)=\lim_{n\to\infty}\frac{n^2\left(\frac{1}{n}+3\right)}{n^2\left(\frac{1}{n^2}-\frac{1}{n}-1\right)}-\lim_{n\to\infty}\frac{1}{n}=-3-0=-3$

i) $\lim_{x\to 2}(x+3x^2)=2+3\cdot 4=14$

j) $\lim_{x\to 6}x(x-5)=6\cdot(6-5)=6$

k) $\lim_{x\to -1}\frac{x^2-3x+2}{2x-1}=\frac{1+3+2}{-2-1}=-2$

l) $\lim_{x\to 2}\frac{2x-4}{x+1}=\frac{0}{3}=0$

m) $\lim_{x\to 0}\frac{5x}{3x}=\frac{5}{3}=1\frac{2}{3}$

n) $\lim_{x\to 0}\frac{2x^2-x}{3x}=\lim_{x\to 0}\frac{x(2x-1)}{3x}=-\frac{1}{3}$

o) $\lim_{x\to 0}\left(\frac{1}{x}-\frac{x+2}{2x}\right)=\lim_{x\to 0}\frac{2-x-2}{2x}=\lim_{x\to 0}\frac{-x}{2x}=-\frac{1}{2}$

p) $\lim_{x\to 1}\frac{x^2-4x+3}{(x-1)(x+4)}=\lim_{x\to 1}\frac{(x-1)(x-3)}{(x-1)(x+4)}=\frac{-2}{5}$