Workshop Analysis WS 2004/05 - Lösungen

Folgen und Reihen - Berechnung von Grenzwerten

Petra Grell

1. (a) $\lim\limits_{n\to\infty} \dfrac{3-6n}{12+8n} = \lim\limits_{n\to\infty} \dfrac{\frac{3}{n}-\frac{6n}{n}}{\frac{12}{n}+\frac{8n}{n}} = \lim\limits_{n\to\infty} \dfrac{\frac{3}{n}-6}{\frac{12}{n}+8} = \dfrac{0-6}{0+8} = -\dfrac{3}{4}$

   (b) $\lim\limits_{n\to\infty} \dfrac{2n-1}{n} = \lim\limits_{n\to\infty} \dfrac{\frac{2n}{n}-\frac{1}{n}}{\frac{n}{n}} = \lim\limits_{n\to\infty} \dfrac{2-\frac{1}{n}}{1} = \dfrac{2-0}{1} = 2$

   (c) $\lim\limits_{n\to\infty} \dfrac{n^2-n}{n^3} = \lim\limits_{n\to\infty} \dfrac{\frac{n^2}{n^3}-\frac{n}{n^3}}{\frac{n^3}{n^3}} = \lim\limits_{n\to\infty} \dfrac{\frac{1}{n}-\frac{1}{n^2}}{1} = \dfrac{0-0}{1} = 0$

   (d) $\lim\limits_{n\to\infty} \dfrac{3n^2}{2+4n} = \lim\limits_{n\to\infty} \dfrac{\frac{3n^2}{n^2}}{\frac{2}{n^2}+\frac{4n}{n^2}} = \lim\limits_{n\to\infty} \dfrac{3}{\frac{2}{n^2}+\frac{4}{n}} = \dfrac{3}{0+0} = \infty$

   (e) $\lim\limits_{n\to\infty} \left(\dfrac{7n}{2n-1} - \dfrac{4n^2-1}{5-3n^2}\right) = \lim\limits_{n\to\infty} \dfrac{7n}{2n-1} - \lim\limits_{n\to\infty} \dfrac{4n^2-1}{5-3n^2} =$

   $= \lim\limits_{n\to\infty} \dfrac{7}{2-\frac{1}{n}} - \lim\limits_{n\to\infty} \dfrac{4-\frac{1}{n^2}}{\frac{5}{n^2}-3} = \dfrac{7}{2} - \dfrac{4}{-3} = \dfrac{29}{6}$