1210.

а)

$$\lim_{n\to\infty}\frac{(n+1)^3-(n-1)^3}{(n+1)^2+(n-1)^2}=\lim_{n\to\infty}\frac{n^3+3n^2+3n+1-n^3+3n^2-3n+1}{n^2+2n+1+n^2-2n+1}=\lim_{n\to\infty}\frac{6n^2+2}{2n^2+2}:\frac{n^2}{n^2}=$$

$$\lim_{n\to\infty}\frac{6+2\cdot\frac{1}{n^2}}{2+2\cdot\frac{1}{n^2}}=\lim_{n\to\infty}\frac{6+2\cdot 0}{2+2\cdot 0}=3$$

в)

$$\lim_{n\to\infty}\left(\frac{2n^2}{2n+3}+\frac{1-3n^3}{3n^2+1}\right)=\lim_{n\to\infty}\frac{6n^4+2n^2+2n+3-6n^4-9n^3}{6n^3+2n+9n^2+3}=$$

$$\lim_{n\to\infty}\frac{-9n^3 2n^2+2n+3}{6n^3+9n^2+2n+3}:\frac{n^3}{n^3}=\lim_{n\to\infty}\frac{-9+2\cdot\frac{1}{n}+2\cdot\frac{1}{n^2}+3\cdot\frac{1}{n^3}}{6+9\cdot\frac{1}{n}+2\cdot\frac{1}{n^2}+3\cdot\frac{1}{n^3}}=\lim_{n\to\infty}\frac{-9+2\cdot 0+2\cdot 0+3\cdot 0}{6+9\cdot 0+2\cdot 0+3\cdot 0}=-\frac{3}{2}$$

1211.

б)

$$\lim_{n\to\infty}\frac{(n+2)!-(n+1)!}{(n+3)!}=\lim_{n\to\infty}\frac{(n+2)(n+1)!-(n+1)!}{(n+3)(n+2)(n+1)!}=\lim_{n\to\infty}\frac{(n+1)!(n+2-1)}{(n+3)(n+2)(n+1)!}=$$

$$\lim_{n\to\infty}\frac{n+1}{n^2+5n+6}:\frac{n^2}{n^2}=\lim_{n\to\infty}\frac{\frac{1}{n}+\frac{1}{n^2}}{1+5\cdot\frac{1}{n}+6\cdot\frac{1}{n^2}}=\lim_{n\to\infty}\frac{0+0}{1+0+0}=0$$

1213.

ђ)

$$\mathbf{Sn}=\frac{n}{2}(1+4n-3)=\frac{n}{2}(4n-2)=\mathbf{2n^2-n}$$

$$\lim_{n\to\infty}\left(\frac{1+5+9+\cdots+(4n-3)}{2(n+1)}-n\right)=\lim_{n\to\infty}\frac{2n^2+n-2n^2-2n}{2n+2}=\lim_{n\to\infty}\frac{-3n}{2n+2}:\frac{n}{n}=$$

$$\lim_{n\to\infty}\frac{-3}{2+2\cdot\frac{1}{n}}=\lim_{n\to\infty}\frac{-3}{2+2\cdot 0}=-\frac{3}{2}$$