GRANICE CIĄGÓW LICZBOWYCH - zadania przykładowe

Zad.1 Obliczyć granice

A) $\lim\limits_{n\to\infty} \sqrt{25n^6 - 3n^5 + n^3 - 22}$

B) $\lim\limits_{n\to\infty} \sqrt[3]{-27n^3 + 2n^2 - n + 33}$

C) $\lim\limits_{n\to\infty} \frac{200n^{200}-20n^{20}+5n^2}{-20n^{22}+33n^3-n+200}$

D) $\lim\limits_{n\to\infty} \frac{2n^3-n^2+n-22}{5n^4-2n^3+2n-8}$

E) $\lim\limits_{n\to\infty} \frac{(n+1)^{30}(-n^2+3)^2(2n+5)}{(-n^6+3)^5(3n^2-4)^2}$

F) $\lim\limits_{n\to\infty} \frac{(n^3+4)^3(-n+3)^5(4n+88)}{(-n+4)^4(-2n+1)(2n^2-6)^6}$

G) $\lim\limits_{n\to\infty} \frac{2\cdot 2^n-4\cdot 3^{2n+1}\cdot 4^{n-2}}{2^{2n+2}\cdot 3^{n-1}-44\cdot 4^{n-1}}$

H) $\lim\limits_{n\to\infty} \frac{2^n\cdot 3^{2n-1}-4\cdot 5^{n+2}}{4^{n+3}+36^{n+1}\cdot 2^{-n-2}}$

Zad.2 Obliczyć granice

A) $\lim\limits_{n\to\infty} \frac{\sqrt{1+2+\cdots+n}}{n}$

B) $\lim\limits_{n\to\infty} \frac{1+2-3+4+5-6+7+8-9+\cdots-3n}{n^2+n+1}$, odp.: $\frac{3}{2}$

C) $\lim\limits_{n\to\infty} \frac{\binom{n+2}{n}}{n^2}$

D) $\lim\limits_{n\to\infty} \frac{1-2+3-4+\cdots-2n}{\sqrt{n^2+1}}$

E) $\lim\limits_{n\to\infty} \frac{1+\frac{1}{2}+\frac{1}{4}+\cdots+\frac{1}{2^n}}{\frac{1}{3}+\frac{1}{9}+\cdots\frac{1}{3^n}}$

F) $\lim\limits_{n\to\infty} \sqrt{2}\cdot\sqrt[4]{2}\cdot\sqrt[8]{2}\cdot\cdots\cdot\sqrt[2^n]{2}$

G) $\lim\limits_{n\to\infty} \left[\frac{1}{n}\binom{n}{1}+\frac{1}{n^2}\binom{n}{2}+\frac{1}{n^3}\binom{n}{3}\right]$

H) $\lim\limits_{n\to\infty} \frac{(n+2)!+(n+1)!}{(n+2)!-(n+1)!}$

Zad.3 Obliczyć granice

A) $\lim\limits_{n\to\infty} (\sqrt{n^4+n^2}-\sqrt{n^4-n^2})$

B) $\lim\limits_{n\to\infty} \frac{\sqrt{n^2+5}-n}{\sqrt{n^2+2}-n}$

C) $\lim\limits_{n\to\infty} \left(\sqrt[3]{n(n+1)^2}-\sqrt[3]{n(n-1)^2}\right)$

D) $\lim\limits_{n\to\infty} \sqrt{n(n-\sqrt{n^2-1})}$

E) $\lim\limits_{n\to\infty} \frac{n^2+3n-1}{-2n^2+n}\left(\sqrt{n+\sqrt{n}}-\sqrt{n-\sqrt{n}}\right)$

Zad.4 Obliczyć granice

A) $\lim\limits_{n\to\infty} \frac{4\cdot 6^{n+1}\cdot 3^{n-2}+15^{n-1}}{-2\cdot 3^{2n+1}\cdot 2^n+16^{n+2}}$

B) $\lim\limits_{n\to\infty} \frac{3\cdot 5^{n-1}\cdot 2^{3n+2}-5\cdot 5^{n-1}\cdot 2^{2n+2}+8}{8\cdot 2^{2n-2}\cdot 3^{2n-1}-9\cdot 2^{4n-1}\cdot 3^{n-2}}$

C) $\lim\limits_{n\to\infty} \frac{7\cdot 6^{n-1}\cdot 2^{3n}+5^n\cdot 2^{2n+1}}{5\cdot 2^{3n-1}\cdot 3^{n-1}+6^{n+1}\cdot 3^n}$

Zad.5 Obliczyć granice

A) $\lim\limits_{n\to\infty}\left(\frac{2n^2-n}{2n^2+3n}\right)^{n-6}$

B) $\lim\limits_{n\to\infty}\left(\frac{5n+2}{5n-1}\right)^{-7n^2-3}$

C) $\lim\limits_{n\to\infty}\left(\frac{2n^2+n+1}{2n^2+n-3}\right)^{n-6}$

D) $\lim\limits_{n\to\infty}\left(\frac{\frac{1}{3}n\binom{n}{2}}{\binom{n}{3}}\right)^{5n+1}$

E) $\lim\limits_{n\to\infty}\left(\frac{4n+1}{4n}\right)^{10n}$

Zad.6 Korzystając z twierdzenia o trzech ciągach obliczyć granice:

A) $\lim\limits_{n\to\infty}\sqrt[n]{5\cdot 3^n+3\cdot 2^n+\pi^{-n}}$

B) $\lim\limits_{n\to\infty}\sqrt[n]{\frac{2^n+2\cdot 8^n}{5\cdot 2^{2n}+4^n+10^n}}$

C) $\lim\limits_{n\to\infty}\frac{5\sin(n!+3n)+3n}{\sqrt{n^2+3n+1}}$

D) $\lim\limits_{n\to\infty}\frac{5-\cos(2n)}{n^3+23}$

E) $\lim\limits_{n\to\infty}\left(\frac{1}{n^2+1}+\frac{2}{n^2+2}+\cdots+\frac{n}{n^2+n}\right)$