

## Granice ciągów

### Zad 1.

Oblicz granicę ciągów

$$1) u_n = \frac{n}{n+1}$$

$$2) u_n = \frac{4n-3}{6-5n}$$

$$3) u_n = \frac{n^2-1}{3-n^3}$$

$$4) u_n = \frac{2n^3-4n-1}{6n+3n^2-n^3}$$

$$5) u_n = \frac{(n-1)(n+3)}{3n^2+5}$$

$$6) u_n = \frac{(2n-1)^2}{(4n-1)(3n+2)}$$

$$7) u_n = \frac{(2n-1)^3}{(4n-1)^2(1-5n)}$$

$$8) u_n = \frac{3}{n} - \frac{10}{\sqrt{n}}$$

$$9) u_n = \frac{(-1)^n}{2n-1}$$

$$10) u_n = \left(\frac{2n-3}{3n+1}\right)^2$$

$$11) u_n = \left(\frac{5n-2}{3n-1}\right)^3$$

$$12) u_n = \frac{(\sqrt{n}+3)^2}{n+1}$$

$$13) u_n = \frac{\sqrt{n}-2}{3n+5}$$

$$14) u_n = \frac{n-10}{3}$$

$$15) u_n = \frac{(-0,8)^n}{2n-5}$$

$$16) u_n = \frac{2-5n-10n^2}{3n+15}$$

$$17) u_n = \frac{2n+(-1)^n}{n}$$

$$18) u_n = \frac{\sqrt{1+2n^2}-\sqrt{1+4n^2}}{n}$$

$$19) u_n = \sqrt{\frac{3n-2}{n+10}}$$

$$20) u_n = \sqrt[3]{\frac{n-1}{8n+10}}$$

$$21) u_n = \frac{\sqrt{n^2+4}}{3n-2}$$

$$22) u_n = \frac{n}{\sqrt[3]{n^3+1}}$$

$$23) u_n = \frac{n}{\sqrt[3]{8n^3-n-n}}$$

$$24) u_n = \frac{1}{\sqrt{4n^2+7n-2n}}$$

$$25) u_n = \sqrt{n+2} - \sqrt{n}$$

$$26) u_n = \sqrt{n^2+n} - n$$

$$27) u_n = n - \sqrt{n^2+5n}$$

$$28) u_n = \sqrt{3n^2+2n-5} - n\sqrt{3}$$

$$29) u_n = 3n - \sqrt{9n^2+6n-15}$$

$$30) u_n = \sqrt[3]{n^3+4n^2} - n$$

$$31) \ u_n = \sqrt[3]{n^2(2 - \sqrt[3]{2n^3 + 5n^2 - 7})}$$

$$32) \ u_n = \frac{4^n - 1}{2^{2n} - 7}$$

$$33) \ u_n = \frac{5 \cdot 3^{2n} - 1}{4 \cdot 9^n + 7}$$

$$34) \ u_n = \frac{3 \cdot 2^{2n+2} - 10}{5 \cdot 4^{n-1} + 3}$$

$$35) \ u_n = \frac{-8^n - 1}{7^{n+1}}$$

$$36) \ u_n = \frac{2^{n+1} - 3^{n+2}}{3^{n+2}}$$

$$37) \ u_n = \left(\frac{3}{2}\right)^n \frac{2^{n+1} - 1}{3^{n+1} - 1}$$

$$38) \ u_n = \sqrt[n]{3^n + 2^n}$$

$$39) \ u_n = \sqrt[n]{10^n + 9^n + 8^n}$$

$$40) \ u_n = \sqrt[n]{10^{100} - \frac{1}{10^{100}}}$$

$$41) \ u_n = \sqrt[n]{\left(\frac{2}{3}\right)^n + \left(\frac{3}{4}\right)^n}$$

$$42) \ u_n = \frac{1+2+\dots+n}{n^2}$$

$$43) \ u_n = \frac{1^2+2^2+\dots+n^2}{n^3}$$