

Matematika pro ekonomy
Domácí úkol 6
Limity posloupností II

Vypočtěte limity následujících posloupností:

1. $\lim_{n \rightarrow \infty} \frac{\left(\frac{7}{5}\right)^n - \left(\frac{6}{5}\right)^{2n+1}}{\left(\frac{5}{4}\right)^n + \left(\frac{144}{100}\right)^n}$

2. $\lim_{n \rightarrow \infty} \frac{\sqrt{n^3+5n^2} - \sqrt{n^3-5n^2}}{\sqrt{n}}$

3. $\lim_{n \rightarrow \infty} \frac{(n+1)(n+2)(n+3) - n^3}{(n+4)(n+5)(n+6) - n^3}$

4. $\lim_{n \rightarrow \infty} \frac{3 \cdot \left(\frac{2}{3}\right)^n + 5 \cdot \left(\frac{3}{5}\right)^n + 8 \cdot \left(\frac{5}{8}\right)^n}{2 \cdot \left(\frac{2}{3}\right)^n + 3 \cdot \left(\frac{3}{5}\right)^n + 5 \cdot \left(\frac{5}{8}\right)^n}$

5. $\lim_{n \rightarrow \infty} \sqrt{n} (\sqrt{n^3 + 4n} - \sqrt{n^3 - 4n})$

6. $\lim_{n \rightarrow \infty} \frac{\left(\frac{3}{2}\right)^n + \left(\frac{4}{3}\right)^{2n+1}}{\left(\frac{8}{5}\right)^n + \left(\frac{4}{3}\right)^{2n}}$

7. $\lim_{n \rightarrow \infty} \frac{\sqrt{4n+5} \cdot \sqrt{n^3+2n^2+3n-7}}{(2n+1)^3 - (2n-1)^3}$

8. $\lim_{n \rightarrow \infty} \frac{1}{\sqrt{n}} (\sqrt{n^3 - 2n + 1} - \sqrt{n^3 - 9n^2 + 3n + 2})$

9. $\lim_{n \rightarrow \infty} \frac{(2n+1)^3 - 4n(n\sqrt{2}-3)^2}{n\sqrt{n^2+3n+1}}$

10. $\lim_{n \rightarrow \infty} \frac{7 \cdot 2^{3n} - \frac{1}{9^n} + 2 \cdot \left(\frac{7}{2}\right)^{2n}}{5 \cdot 4^n - 4 \cdot (3,5)^{2n} + \left(\frac{1}{2}\right)^{4n}}$

11. $\lim_{n \rightarrow \infty} \sqrt{n^4 + 359n - 2} - n^2 + 6$

12. $\lim_{n \rightarrow \infty} \frac{\sqrt{n^3+n^2-2} - \sqrt{n^3-n^2+2}}{\sqrt{n}}$

13. $\lim_{n \rightarrow \infty} \frac{5 \cdot \left(\frac{2}{5}\right)^{2n} + 3 \cdot \left(\frac{1}{3}\right)^n}{7 \cdot \left(\frac{2}{7}\right)^n + 9 \cdot \left(\frac{1}{9}\right)^{n/2}}$

14. $\lim_{n \rightarrow \infty} \frac{(n^2+3)^2 - (n^2-3)^2}{(2n+5)^2 + (2n-5)^2}$

15. $\lim_{n \rightarrow \infty} \frac{6 \cdot \left(\frac{3}{2}\right)^{2n} + 4 \cdot \left(\frac{7}{5}\right)^n}{3 \cdot \left(\frac{18}{9}\right)^n - 2 \cdot (2,25)^n}$

16. $\lim_{n \rightarrow \infty} \sqrt{n} (\sqrt{n^3 + 3n + 1} - \sqrt{n^3 + 3n - 1})$

17. $\lim_{n \rightarrow \infty} \frac{\sqrt[3]{27n-1} \cdot \sqrt[3]{(n+1)^2}}{(2n-3)(2n+3) - 16\left(\frac{1}{2}n+1\right)^2}$

18. $\lim_{n \rightarrow \infty} \frac{5 \cdot \left(\frac{2}{5}\right)^{4n} - 3 \cdot \left(\frac{4}{5}\right)^{3n} + 2 \cdot (0,5)^n}{8 \cdot \left(\frac{25}{100}\right)^{\frac{n}{2}} + 4 \cdot (0,8)^{3n} + \frac{1}{7^{2n}}}$

19. $\lim_{n \rightarrow \infty} \frac{n^2 \sqrt{(4n-3)^3 - 16n(2n-4)^2}}{n((n \cdot \sqrt{3} - 2)^2 + (2n+3)^2)}$

Řešení: 1. $-\frac{6}{5}$, 2. 5, 3. $\frac{2}{5}$, 4. $\frac{3}{2}$, 5. 4, 6. $\frac{4}{3}$, 7. $\frac{1}{12}$,
8. $\frac{9}{2}$, 9. $12 + 24\sqrt{2}$, 10. $-\frac{1}{2}$, 11. 6, 12. 1, 13. $\frac{1}{3}$,
14. $\frac{3}{2}$, 15. -3 , 16. 0, 17. $-\frac{3}{16}$, 18. $-\frac{3}{4}$, 19. $\frac{4\sqrt{7}}{7}$.