

## Matematika pro ekonomy

### Domácí úkol 6

#### Limity posloupností II (výběr z testů z let 2014-15)

Vypočtete limity následujících výrazů pro  $n \rightarrow \infty$ :

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

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

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

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

5.  $\sqrt{n} \left( \sqrt{n^3 + 4n} - \sqrt{n^3 - 4n} \right)$

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

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

8.  $\frac{1}{\sqrt{n}} \left( \sqrt{n^3 - 2n + 1} - \sqrt{n^3 - 9n^2 + 3n + 2} \right)$

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

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

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

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

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

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

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

16.  $\sqrt{n} \left( \sqrt{n^3 + 3n + 1} - \sqrt{n^3 + 3n - 1} \right)$

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

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

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

**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.  $\frac{4\sqrt{7}}{7}$ .