

## Příklady zápočtových úloh

Spočtete limity.

$$1. \lim_{x \rightarrow 0} \frac{\sin x \cdot \sin 3x - 3x^2 + 6x^4}{\arctan^4 x - 6x^4}$$

$$2. \lim_{x \rightarrow 0} \frac{\sin x \cdot \sin 3x - 3x^2 + 5x^4}{\arctan^4 x - x^4}$$

$$3. \lim_{x \rightarrow 0} \frac{\log(1-x) + xe^{x/2}}{\sin x - x}$$

$$4. \lim_{x \rightarrow 0} \frac{\sin(\log(1+x)) - \log(1+\sin x)}{x^4}$$

$$5. \lim_{x \rightarrow 0} \frac{\tan x - x - \frac{x^2}{3}}{x^2 \left( e^x - 1 - \frac{x^2}{2} \right)}$$

$$6. \lim_{x \rightarrow 0} \frac{x \cos x - \sin x}{\exp(\sin^3 x) - 1}$$

$$7. \lim_{x \rightarrow 0} \frac{e^{\sin x} - e^x}{x \log(1+x^2)}$$

$$8. \lim_{x \rightarrow 0} \frac{e^{x^2} - x \sin x - 1}{e^{x^4} - 1}$$

$$9. \lim_{x \rightarrow 0} \frac{\sin x \cdot \cos x + e^{-x} - 1 - \frac{1}{2} \sin^2 x}{\sin^3 x}$$

$$10. \lim_{x \rightarrow 0} \frac{x \log(1+\sin x) + 2 \log \cos x}{x^3}$$

$$11. \lim_{x \rightarrow 0} \frac{\log(1+x)}{\cos x - 1} + \frac{2}{x}$$

$$12. \lim_{x \rightarrow 0} \frac{\sin(e^x \sin x) - \sin(e^x - 1) + \log(1 - \frac{x^2}{2})}{\sin^3 x}$$

$$13. \lim_{x \rightarrow 0} \frac{\log(\cos 2x) - 4 \log(\cos x)}{\log(1+x^4)}$$

$$14. \lim_{x \rightarrow 0} \frac{e^x \sin 2x - 2e^{2x} \sin x - 4 \cos x + 4}{\sin x - x}$$

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15.  $\lim_{x \rightarrow 0} \frac{(1+3x)^x + (1-3x)^x - 2}{e^{x^3} - 1}$
16.  $\lim_{x \rightarrow 0} \frac{(1+3x)^{(x^2)} - (1+x^2)^{3x}}{(1-\cos x)^2}$
17.  $\lim_{x \rightarrow 0} \frac{\log(1+x \sin x) - \exp(x \sin x) + \cos(x \sin x)}{\sin^4 x}$
18.  $\lim_{x \rightarrow 0} \frac{\sin(e^{(x^2)} - 1) + 2 \sin(\cos(x) - 1)}{\log(1+x^4)}$
19.  $\lim_{x \rightarrow 0} \frac{e^{x \sin x} - \cos(\sin x) + 3 \cos x - 3 \cos(x^2)}{\sin^4 x}$
20.  $\lim_{x \rightarrow 0} \frac{(1+\sin x)^x + (\cos x)^x - \sin^2 x}{\tan^4 x}$
21.  $\lim_{x \rightarrow 0} \frac{\sin(2 \sin x) - 2 \sin(\sin x) + \sin^3 x}{x(1-\cos(x^2))}$
22.  $\lim_{x \rightarrow 0} \frac{e^{1-\cos 3x} - e^{1-\cos 4x} - 7x + 7}{(1-\cos x)^2}$
23.  $\lim_{x \rightarrow 0} \frac{\cos(e^{2x} - 1) - 4 \cos(e^x - 1) + 2e^{x^3} + 1}{\sin^4 x}$
24.  $\lim_{x \rightarrow 0} \frac{\log \frac{1+e^{2x}}{2} - \log(\cos x + \sin x) + 3 \cos x - 3}{\log(1+x^3)}$
25.  $\lim_{x \rightarrow 0} \frac{\cos(2 \sin x) - \cos(\sin x) + \sin^2 x + \frac{x^2}{2}}{1-\cos(x^2)}$
26.  $\lim_{x \rightarrow 0} \frac{(1-\sin(x^2))^{\cos x} - 2(\cos x)^{\cos x} + 1}{(e^x - 1)^4}$
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26.  $\lim_{x \rightarrow 0} \frac{(1-\sin(x^2))^{\cos x} - 2(\cos x)^{\cos x} + 1}{(e^x - 1)^4}$

### Některé výsledky

Výsledky úkolů 1-8 jsou v souboru "Cvičení 3, výsledky".

- |                    |   |
|--------------------|---|
| 9. $\frac{-5}{6}$  | 16. $-18$   |
| 10. $\frac{-1}{2}$ | 17. $\frac{-3}{2}$  |
| 11. $1$            | 18. $\frac{7}{12}$  |
| 12. $\frac{1}{6}$  | 19. $\frac{7}{4}$   |
| 13. $-1$           | 20. $\infty$ , nebo neexistuje. Když zadání upravíme změnou znaménka před $\cos$ , dostaneme výsledek $1$ . |
| 14. $24$           | 21. $\frac{1}{2}$   |
| 15. $-9$           |   |