NAME AND SURNAME	INDEX NUMBER	GROUP

TEST II *December 14th*

(Ex 1) *(1 pt)* Find the domain of $f(x) = \log_{3x-12}(x^2 - 9)$.

(Ex 2) *(0.5 pt)* Calculate the exact value of $4^{\log_6 4 - \log_6 \frac{1}{9}}$.

(Ex 3) *(2 pts)* Let $f(x) = 3\log_2(5x + 1)$, find: the inverse function $f^{-1}(x)$, D_f, Y_f, $D_{f^{-1}}$ and $Y_{f^{-1}}$.

(Ex 4) *(1.5 pts)* Solve $\log_{0.5}(x - 3) - \log_{0.5}(3 + x) < 2$

(Ex 5) *(0.5 pt)* Calculate $\sin(\frac{5\pi}{6}) + \cos(\frac{7\pi}{4}) - \tan(\frac{2\pi}{3})$.

(Ex 6) *(1 pt)* Prove that $\cos(2x) = \frac{1-\tan^2(x)}{1+\tan^2(x)}$.

Theory. *(1 pt)* Give a definition of a bounded sequence.

(Ex 7) *(1 pt)* Draw the graph of $f(x) = |2\sin(x + \frac{\pi}{2}) - 1|$ step by step and find D_f and Y_f.

(Ex 8) *(2×1 pt)* Solve: a) $\sin(2x) = \frac{\sqrt{2}}{2}$, b) $\tan^3(x) - 1 = -\tan^2(x) + \tan(x)$.

(Ex 9) *(1.5 pts)* Find D_f, Y_f and draw the graph of $f(x) = 2\arcsin(\frac{x-1}{2}) + \frac{\pi}{4}$.

(Ex 10) *(1 pt)* It is known, that in some geometric sequence $a_4 = 2$. Calculate $a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot a_5 \cdot a_6 \cdot a_7$.

(Ex 11) *(4×0.5 pt)* Calculate limits:

a) $\lim\limits_{n\to\infty} \frac{3\cdot 3^{2n+1} - 2\cdot 2^n + 2}{4\cdot 4^n - 5\cdot 9^n + 7} =$

b) $\lim\limits_{n\to\infty} (\frac{2n-1}{2n+3})^{2n+2} =$

c) $\lim\limits_{n\to\infty} \sqrt[n]{e^n + \pi^n + \cos(n)} =$

d) $\lim\limits_{n\to\infty} \frac{2+4+6+\cdots+2n}{1+2+3+\cdots+n} =$