NAME AND SURNAME	INDEX NUMBER	GROUP

TEST I *November 24th*

(Ex 1) *(3 pt)* Establish the convergence of the series $\sum_{n=1}^{\infty} \cos(\frac{\pi}{2}(2n+1))$ using the sequence of partial sums (S_n).

(Ex 2) *(2 pt)* Apply the necessary condition for convergence to the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$.

(Ex 3a) *(2 pts)* Establish the convergence of the series $\sum_{n=1}^{\infty} \sin^n(\frac{\pi n+1}{4n+1})$ using an appropriate test.

(Ex 3b) *(1 pt)* Write the definition of the test you used.

(Ex 4) *(3 pts)* Establish, whether the series $\sum_{n=1}^{\infty} (-1)^n \frac{n^2}{n^4+2}$ is absolutely convergent, conditionally convergent or divergent.

(Ex 5) *(2 pts)* Show that the limit $\lim_{(x,y)\to(0,0)} \frac{5x^2y^2}{x^4+3y^4}$ doesn't exit. Use any method you like.

(Ex 6) *(4 pts)* Find all extremes and saddle points of the function $f(x, y) = x^3 + 8y^3 - 6xy + 5$.

Ex 7) *(2 pts)* Check if $f(x, y) = \ln(x^2 + y^2)$ is the answer to an equation $f_x + f_y = \frac{(2yx+y^2)'_y}{x^2+y^2}$.

(Ex 8) *(1 pt)* Describe the procedure of changing Cartesian coordinates (x, y) into polar coordinates. Draw a graph.

(Ex 9) *(2 pts)* **Bonus exercise:** Find the approximated value and both errors for $\ln(1.01) \cdot \frac{1}{2.01} \cdot (4.95)^2$ if you know that $V_c = 0.121298$.