NAME AND SURNAME	INDEX NUMBER	GROUP

TEST I *November 24th*

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

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

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

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

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

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

(Ex 6) *(4 pts)* Find all extremes and saddle points of the function $f(x,y) = x^3 + 3xy^2 + 12xy$.

Ex 7) *(2 pts)* Check if $f(x,y) = x\sin y + y\sin x$ is the answer to an equation $f_{xx} + f_{yy} = f(x,y)$.

(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 $(0.02)^2\cdot(1.03)^3 - (1.03)\cdot(9.99)^2$ if you know that $V_c = -102.7936659$.