TD Test 1

Name : **Surname :** **Group :**

Question from the class

Let $(\alpha, \beta) \in \mathbb{R}^2$. Remind of the necessary and sufficient conditions for the convergence of the series $\sum \frac{1}{n^\alpha \big(\ln(n)\big)^\beta}$.

Exercise 1

Determine $\lim\limits_{x \to 0} \dfrac{1 - \ln(1+x^2) - \cos(2x)}{1 - \sqrt{1-x^2}}$.

Exercise 2

1. Determine the nature of the series $\sum \frac{(n!)^2 3^n}{(2n)!}$.

2. First, determine $\lim\limits_{n\to+\infty} \sqrt[n]{n}$, and then, give the nature of the series $\sum \frac{1}{n\sqrt[n]{n}}$ by reasoning with an equivalent.