# 2020
# MATHEMATICS HONOURS
## Paper: CC-8
## Internal Assessment
## Full Marks: 10

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
Notations and symbols have their usual meaning.

1. Let f be a bounded function defined on [a,b] and let P be a partition on [a,b]. If $P^*$ is a refinement on P, then

   a. $L(P^*, f) \leq L(P, f)$
   b. $U(P^*, f) \leq U(P, f)$
   c. $U(P^*, f) \geq U(P, f)$
   d. $L(P^*, f) = U(P, f)$.

2. A bounded function f is Riemann integrable in [a,b] if the set of its points of discontinuity is:

   a. Infinite b. Denumerable c. Finite d. None of these.

3. $\int_0^\infty xe^{-x^2}\, dx =$

   a. 2e b. 2 c. Diverges to infinity d. $\frac{1}{2}$ .

4. Find correct one about the series $\sum \frac{x^n}{n(n+1)}$

   a. Convergent everywhere
   b. Absolutely convergent in (-1,1]
   c. Uniformly and absolutely convergent (-1,1]
   d. Uniformly convergent in [-1,1].

5. If the power series $\sum a_n x^n$ has radius of convergence R then the radius of convergence of the power series $\sum a_n x^{2n}$ is

   a. R b. $R^2$ c. $\sqrt{R}$ d. $\frac{1}{R}$ .

# 2020
# MATHEMATICS HONOURS
## Paper: CC-8
## Theory Examination
## Full Marks: 32

The figures in the margin indicate full marks.
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**Answer any FOUR questions:** $8\times 4$

1. State and prove the Cauchy criterion for uniform convergence of series of functions.

2. Prove that if $f: [a, b] \to R$ be a Riemann integrable function, then f is bounded. Is the converse of above result is true?

3. Test the convergence of $\int_1^\infty \frac{1}{x^2} dx$ .

4. Give an example of a sequence of functions which point-wise converges to a function but not uniformly converges to that function. Justify your answer.

5. Show that every continuous function is integrable.