

# **AFS-I - Annual Foundation School - I (2024) IIT Hyderabad**

Venue: MA416, Department of Mathematics

**Dates: 2 Dec 2024 to 28 Dec 2024**

**Funded by National Centre for Mathematics and IIT Hyderabad**

# Conveners



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# Linear Algebra and Group Theory [Speakers]



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# Linear Algebra and Group Theory [Course Associates]



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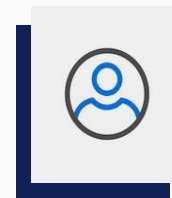
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# Complex Analysis [Speakers]



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**Dr. P Muthukumar**

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# Complex Analysis [Course Associates]



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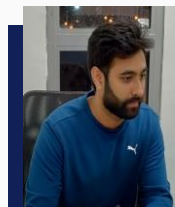
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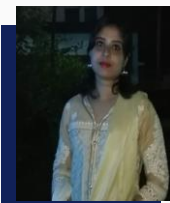
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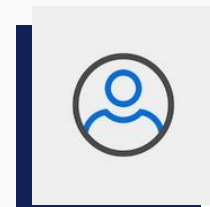
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# Topology [Speakers]



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# Topology [Course Associates]



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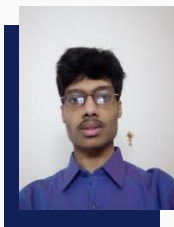
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## Annual Foundation School - I



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1. Let  $X$  be a metric space with metric  $d$ . Show that  $d_1$ , defined by

$$d_1(x, y) = \frac{d(x, y)}{1 + d(x, y)}$$

is also a metric on  $X$ . Observe that  $X$  itself is a bounded set in the metric space  $(X, d_1)$ .

2. Let  $X = \{0, 1\}^n$  (the boolean cube), the set of all strings of length  $n$  with entries are from  $\{0, 1\}$ . For  $x, y \in X$ , define  $d(x, y)$  to be the number of coordinates in which  $x$  and  $y$  are differ. Show that  $d$  is a metric.

Let  $G$  be a group. Let  $\{a, b, a^{-1}, b^{-1}\}$  be a generating set for  $G$ . Define  $d(x, y)$  to be the smallest  $k$  such that  $x = y s_1 s_2 \dots s_k$ , where  $s_i \in \{a, b, a^{-1}, b^{-1}\}$  for all  $i$ . Show that  $d$  is a metric on  $G$ .

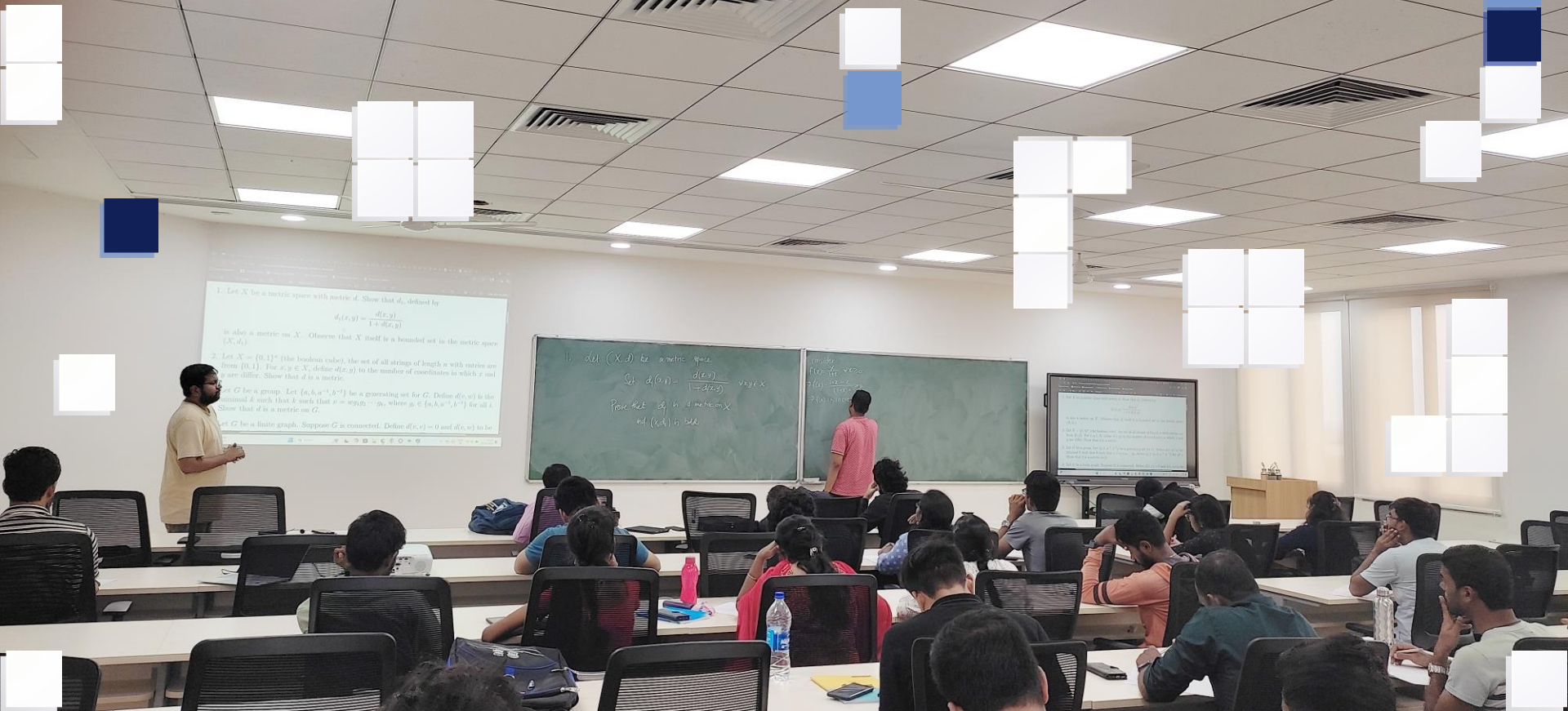
Let  $G$  be a finite group. Suppose  $G$  is connected. Define  $d(x, y) = 0$  and  $d(x, y)$  to be

1. Let  $(X, d)$  be a metric space.

$$d_1(x, y) = \frac{d(x, y)}{1 + d(x, y)}$$

Prove that  $d_1$  is a metric on  $X$  and  $(X, d_1)$  is bounded.

Let  $X = \{0, 1\}^n$  (the boolean cube), the set of all strings of length  $n$  with entries are from  $\{0, 1\}$ . For  $x, y \in X$ , define  $d(x, y)$  to be the number of coordinates in which  $x$  and  $y$  are differ. Show that  $d$  is a metric.



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For more details, please visit the link below

<https://www.atmschools.org/school/2024/AFS-I/afs-i-hyderabad/speakers-and-syllabus>

