Report of the
GAP Section of the
SAGE Days 102 Workshop
at the University of Ibadan

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July 21, 2019.

I am grateful to Opendreamkit and the Department of Mathematics of the University of Ibadan for hosting the Sage Days 102 at Ibadan. I arrived at Ibadan from Enugu on Tuesday 16 July 2019, and the GAP sections of the Workshop held from 17–19 July 2019. I will write briefly on the GAP teaching at Ibadan.

GAP stands for Groups, Algorithms and Programming. It is a system for computational discrete algebra, with particular emphasis on Computational Group Theory. The goals of the GAP section of the Workshop include but not limited to helping the participants get used to some functions in GAP, learn about Small group library, the regression tests as well as how to pose questions so that computer can solve them effectively.

Listed below are some details of the GAP Section of the Workshop.

1. Venue and Date of the Workshop: Department of Mathematics, University of Ibadan; from Wednesday 17 July 2019 to Friday 19 July 2019. The first two days were mainly from 12 noon to 5pm; excluding about 45 minutes lunch break while the last day (Friday) was from about 12 noon to 3pm.

2. Audience (about 8–12 participants were present for the GAP session of the Workshop): They comprise mainly of participants from Nigerian universities.

3. The GAP Class: I served both as an instructor and a tutor in the GAP session of the workshop. I teach for about an hour, then give the students about $15 - 20$ minutes for them to try out a few questions. When the participants are attempting these exercises, I go from seat to seat making sure that each participant is making progress; where a hint is needed, I willingly give one. Otherwise I allow the participant to figure out what best to do.

4. Contents of the GAP course and method of teaching: Beamer Presentation and GAP terminal examples on the following topics:

- What is GAP?

- Why GAP?

- How to install GAP?

- Starting and Leaving GAP

- Getting GAP from SageMath Shell

- How to make a file that will contain your GAP outputs

- Loading Source Code from a File

- Functions in GAP: List, Groups, Help function et-cetera

- Exercise 1

- On Groups in GAP

- Small Group Library in GAP

- Testing whether two groups are isomorphic

- Obeying Cayley's theorem in GAP

- Finitely presented (f.p) groups in GAP

- Exercise 2

- Regression tests in GAP

- Defining a function in GAP

- How to record information in GAP objects

- Exercise 3

We applied the DO–AS–I–DO scheme: allowing participants to practice at the end of each major section of the GAP classes, rather than at the end of the whole course. The participants were encouraged to ask questions within the teaching hours as well as various practical sessions. Summary notes and exercise sheets were also given at various sections of the Workshop.

5. Challenges: The main challenge we experienced was power–outbreak within the first day of the GAP Workshop; which was on Wednesday 17 July 2019. On this fateful day, we stayed at the Mathematics Workroom. This was different from the building the rest of the Workshop groups stayed at. We experience power–outbreak for about 30% of the working hours on 17 July 2019. This was later rectified, and there was no such challenge in other days of the Workshop, and we had smooth delivery of the lectures.

6. EXPENSES

Tuesday 16/07/2019
Transport: From Enugu (Elim Estate) to Ibadan (Midetel hotel): N35,000
Hotel lodging: N6,500
Food and drinks: N1,950+N950=N2,900
Total1: N44,400

Wednesday 17/07/2019
Hotel lodging: N6,500
Food: N800+N3400=N4,200
About 50% off Taxi fares: N500
Total2: N11,200

Thursday 18/07/2019

Hotel lodging: N6,500

Food: N6,150

About 50% off Taxi fares: N300+N400=N700

Total3: N13,350

Friday 19/07/2019

Hotel lodging: N6,500

Food: N1,400

About 50% off Taxi fares: N400+N400=N800

Total4: N8,700

Saturday 20/07/2019

Hotel lodging: N6,500

Food: N6,180

About 50% off Taxi fares: N300+N300=N600

Total5: N13,280

Sunday 21/07/2019

(a) N10,000: From University of Ibadan to International Airport in Lagos.

(b) N600: 50% off fares from International Airport to home Airport Lagos.

(c) N2,300: Food at the airport in Lagos.

(d) N27,500: Reduced cost of ticket from Lagos Airport to Enugu Airport.

(e) N6,000: Taxi from Enugu Airport to home.

Total6: N46,400

TOTAL: N(44400+11200+13350+8700+13280+46400)=N137,330

7. Recommendations: In the future when such workshop will be organised, it will be necessary to disseminate memos on the subject matter at least two months before the start of the programme. Moreover, if possible, considering the population of Nigeria (over 180 million people), it would be a good idea to organise the Workshop at two out of the six geo-political zones in Nigeria; probably, the first in the South-West (for instance Lagos/Ibadan) and the second in the North Central (for instance Abuja) to enable more individuals to attend. Finally, a timetable outlining the schedule of the Workshop is important and should be arranged at least one week before the workshop.

Thank you.