MTH 361
Half Exam 2
Spring 2021

Instructions.

Reminder: intentionally obtaining or attempting to use unauthorized materials or information or unauthorized help from another person is considered cheating.

- Position your webcam to show your hands and work area.
- Keep your hands in view at all times.
- When done with the half exam, type "done" in chat. Stay in the meeting.
- Keep your webcam on, scan and submit on Blackboard, Current Week.
- You may use your phone or iPad to scan after saying you're "done."
- You may use your computer to submit on Blackboard or email.
- After submitting, stay in the meeting. Wait for confirmation before leaving.
- Confirmation is a 1 point posted grade, or a confirmation from me in chat.
- If you leave before confirmation: (1) email *and* (2) submit on Blackboard.
- If you leave or turn off your webcam, I have to receive (1) or (2) within 5 minutes.
- Use chat to ask me questions during the exam.

Show work to support each answer. Notes OK but keep hands in view. No book. Graphing calculator OK. No CAS (e.g., no TI-89, no TI-Nspire CAS). No phone, iPad, or other device, except to scan when "done." Don't use your computer, except to be in the meeting with your webcam on, to see the half exam problems, and to chat with me to ask any questions. You may use your computer to submit after you've scanned.

The problems are on the next page.

Show work to support each answer. Five problems, 10 points each.

1. An isomorphism of a group with itself is called an automorphism of the group. Find the number of automorphisms of the given group.

(a) $\mathbb{Z}_{14}$ (b) $\mathbb{Z}_{20}$

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2. Draw a Cayley digraph for $\mathbb{Z}_{18}$ using the generating set $S = \{4, 9\}$.

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3. Find the maximum possible order for an element of S_n for the given value of n.

(a) $n = 9$ (b) $n = 12$

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4. (a) Find all left cosets of the subgroup $\{\rho_0, \delta_1\}$ of the group D_4 in Table 8.12. (Table 8.12 is on the next page.)

(b) Repeat part (a), but find the right cosets this time. Are they the same as the left cosets?

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5. Let A be a set, and let s and t be particular elements of A. Prove that

$$H = \{\mu \in S_A \mid \mu(s) = s \text{ and } \mu(t) = t\}$$

is a subgroup of S_A.

End

- When done with the half exam, type "done" in chat. Stay in the meeting.
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Table 8.12 for D_4

	ρ_0	ρ_1	ρ_2	ρ_3	μ_1	μ_2	δ_1	δ_2
ρ_0	ρ_0	ρ_1	ρ_2	ρ_3	μ_1	μ_2	δ_1	δ_2
ρ_1	ρ_1	ρ_2	ρ_3	ρ_0	δ_1	δ_2	μ_2	μ_1
ρ_2	ρ_2	ρ_3	ρ_0	ρ_1	μ_2	μ_1	δ_2	δ_1
ρ_3	ρ_3	ρ_0	ρ_1	ρ_2	δ_2	δ_1	μ_1	μ_2
μ_1	μ_1	δ_2	μ_2	δ_1	ρ_0	ρ_2	ρ_3	ρ_1
μ_2	μ_2	δ_1	μ_1	δ_2	ρ_2	ρ_0	ρ_1	ρ_3
δ_1	δ_1	μ_1	δ_2	μ_2	ρ_1	ρ_3	ρ_0	ρ_2
δ_2	δ_2	μ_2	δ_1	μ_1	ρ_3	ρ_1	ρ_2	ρ_0