MAT347Y1 HW4 Marking Scheme

Friday, October 10

Total: 23 points.

3.1.10: 5 points.

- (2) Well-defined (Note: if your proof still seems to work if you replace $\mathbb{Z}/4\mathbb{Z}$ by $\mathbb{Z}/5\mathbb{Z}$, then you're doing something wrong)
- (1) Surjective homomorphism
- (2) Fibers (including kernel), giving the elements of $\mathbb{Z}/8\mathbb{Z}$ explicitly (1 point if they're written in terms of elements in $\mathbb{Z}/4\mathbb{Z}$ or $\mathbb{Z}$)

3.2.11: 5 points.

- 1 point if you used Lagrange's Theorem (the question specifically tells you not to assume G is finite), otherwise graded holistically (5 = perfect, 4 = minor errors, etc.)

Handout #4: 9 points.

- (2) Correct subgroups (1 point off per error)
- (4) Correct containments:
  - (1) Half correct
  - (1) All but 5 correct
  - (1) All but 2 correct
  - (1) Perfect
- (3) Correct normal subgroups (1 point off per error). A surprising number of people forgot to do this part.

Handout #5: 4 points. Let H have index 2 in G.

- (1) If $g \in H$, then $gH = Hg$.
- (3) If $g \in G \setminus H$, then $gH = G \setminus H = Hg$.
- Saying that the set of left cosets and the set of right cosets coincide is not sufficient; you need to show that for any g, the left coset *corresponding to* g coincides with the right coset corresponding to g.
- Note that you can only say H is normal if $gH = Hg$ for all $g \in G$; if you've only proved that $gH = Hg$ for specific values of g, then say "g normalizes H."