## MAT347Y1 HW5 Marking Scheme

Friday, October 17

## Total: 34 points.

**2.2.12:** 14 points.

- (a) (4) one per polynomial
- (b) (2) one per group action axiom checked.
- (c) (2) "exhibit" (1) and "prove" (1)
- (d) (2) "exhibit" (1) and "prove" (1)
- (e) (3) "exhibit" (1) and "prove" (2)
- (f) (1) prove.

**3.3.7:** 6 points. There are two main strategies for solving this one: define a map  $G \to (G/M) \times (G/N)$ , find the kernel, and use the First Isomorphism Theorem, or define a map  $G/(M \cap N) \to (G/M) \times (G/N)$  and prove it's a well-defined isomorphism.

- (1) well-defined homomorphism
- (2) find the kernel or prove injectivity
- (2) prove surjectivity
- (1) correct application of isomorphism theorems

3.5.17: 10 points.

- (2) x and y have three numbers in common (note: if you only consider x = y, you're missing a case: e.g. x = (123), y = (132))
- (3) x and y have two numbers in common.
- (3) x and y have one number in common
- (2) x and y disjoint cycles

*Note:* 4 points were removed (2 from each of the two relevant cases) if you cited problem 16 without proof. As a general rule, you can always cite results from the main text or from lecture, but citing another problem isn't a good idea unless (a) you've proved it on an assignment, or (b) it was from a section of the book covered in a previous week. Since this wasn't made entirely clear, feel free to show Jonathan your marked assignment (to confirm that you did cite problem 16) and a written-up solution to problem 16 and you can get those marks back.

**4.1.1:** 4 points.

- (1)  $G_b \subseteq gG_ag^{-1}$
- (1)  $G_b \supseteq g G_a g^{-1}$
- (2) Find the kernel.