PMAT 315
ASSIGNMENTS WINTER 2010

Assignment 1.

1. §1.1, #15. *Prove the well-ordering axiom by strong induction.* [**Hint**: If X is a nonempty set of non-negative integers with no smallest member, let p_n be the statement $n \notin X$.] 7 marks

2. §1.2, #14. *Show that* $gcd(m+n, m) = gcd(m, n)$. 7 marks

3. §1.2, #17. *If* $gcd(m, n) = 1$ *and* $gcd(k, n) = 1$, *show that* $gcd(mk, n) = 1$. 6 marks

4. §1.3, #22(c). *In* $\mathbb{Z}_{20}$ *find the inverse of* $\overline{11}$ *and use it to solve* $\overline{11}x = \overline{16}$. 6 marks

5. §1.3, #29(b). *Show that* $\bar{a}$ *is invertible in* $\mathbb{Z}_n$ *if and only if* $\bar{a}\bar{b} = \bar{0}$ *implies* $\bar{b} = \bar{0}$. 7 marks

6. §1.4, #26. *Let* γ *be any cycle of length* r. *If* $\sigma \in S_n$, *show that* $\sigma\gamma\sigma^{-1}$ *is also a cycle of length* r. *More precisely, if* $\gamma = (k_1\ k_2\ \cdots\ k_r)$ *show that* $\sigma\gamma\sigma^{-1} = (\sigma k_1\ \sigma k_2\ \cdots\ \sigma k_r)$. 7 marks

Total 40 marks