Assignment 9 – Part 1 – Math 412

Textbook exercises:[1]

None yet.

Other exercises:

(1) From the Chinese Remainder Theorem, $\mathbf{Z}/12\mathbf{Z} \cong \mathbf{Z}/4\mathbf{Z} \times \mathbf{Z}/3\mathbf{Z}$. Write out this bijection explicitly, i.e. for each $a \in \mathbf{Z}/12\mathbf{Z}$, write out the element it corresponds to in $\mathbf{Z}/4\mathbf{Z} \times \mathbf{Z}/3\mathbf{Z}$.

(2) We saw in class that if R is a commutative ring and I, J are ideals in R, then $IJ \subseteq I \cap J$. Show that $(I \cap J)^2 \subseteq IJ$ (where $(I \cap J)^2$ just means the product ideal $(I \cap J)(I \cap J)$).

[1] From Hungerford's *Abstract algebra, An introduction, Third edition*