Abstract Algebra Homework 9

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This problem set includes problems $5b, 8, 18c$, and 27 from section 16.6.

5b) For the given ring R with an ideal I, give an addition and multiplication table for R/I.

<u>Solution</u>: Recall that

$$R/I := \{r + I \,|\, r \in R\}.$$

We can easily see that the three elements of R/I are the following:

$$0 + I = \{0, 3, 6, 9\}$$
$$1 + I = \{1, 4, 7, 10\}$$
$$2 + I = \{2, 5, 8, 11\}.$$

Below is the addition table for R/I. Note that it is implicit, but worth noting, that we are talking about the addition of the three cosets here in R/I.

+	0	1	2
0	0	1	2
1	1	2	0
2	2	0	1

Similarly, here is the multiplication table for R/I. Again, we are talking about multiplication of the cosets in R/I.

*	0	1	2
0	0	0	0
1	0	1	2
2	0	2	1

$\square$