Homework 16 Solutions

Problems

1. (a) Find the addition and multiplication tables for arithmetic modulo 7.
   
   (b) In arithmetic mod 7, what is $3 - 6$? Remember, this is the number that, when added to 6, gives a result of 3.
   
   (c) In arithmetic mod 7, what is $2/5$? Remember, this is the number that, when multiplied by 5, gives a result of 2.
   
   (d) In arithmetic mod 7, what is $5 - 3$?
   
   (e) In arithmetic mod 7, what is $3 - 5$?
   
   (f) In arithmetic mod 7, what is $4/6$?
   
   (g) In arithmetic mod 7, what is $6/4$?
   
   (h) In arithmetic mod 7, what is $0/2$?

If we write down the tables [elided here], we see that each row and column of the addition table has every value in $\{0, 1, 2, 3, 4, 5, 6\}$, so subtraction is well-defined. Similarly, every value appears in each nonzero row and nonzero column of the multiplication table, so division (by nonzero values) is well-defined.

Using our table we observe that $4 + 6 = 3$ hence $3 - 6 = 4$.

Using our table we observe that $5 \times 6 = 2$ hence $2/5 = 6$.

Using our table we observe that $2 + 3 = 5$ hence $5 - 3 = 2$.

Using our table we observe that $5 + 5 = 3$ hence $3 - 5 = 5$.

Using our table we observe that $3 \times 6 = 4$ hence $4/6 = 3$.

Using our table we observe that $5 \times 4 = 6$ hence $6/4 = 5$.

Using our table we observe that $0 \times 2 = 0$ hence $0/2 = 0$. 
