# MTH 309

Additional Problems on Modular Arithmetic (Sec 4.1)

1. Verify each of the following.

   (a) $(5 \oplus_8 6) \oplus_8 7 = 5 \oplus_8 (6 \oplus_8 7)$

   (b) $(5 \odot_8 6) \odot_8 7 = 5 \odot_8 (6 \odot_8 7)$

   (c) $(5 \odot_8 6) \oplus_8 (5 \odot_8 7) = 5 \odot_8 (6 \oplus_8 7)$

   (d) 27 and 32 are additive inverses in $\mathbb{Z}_{59}$

   (e) 27 and 32 are multiplicative inverses in $Z_{863}$

2. Use the additive inverse property to find the additive inverse in $\mathbb{Z}_{35}$ of each of the following:

   (a) 17

   (b) 1

   (c) 34

   (d) 0

3. Prove that for all $m \in \mathbb{Z}_{>1}$, the multiplicative inverse of $m-1$ in $\mathbb{Z}_m$ is $m-1$.