Problem Set 3
Due: Wednesday, September 19

Work all of the following problems. A subset of the problems will be graded. Be sure to adhere to the expectations outlined in the *General Problem Set Guidelines Sheet*.

Unless otherwise stated, all problems can be found in the appropriate *Exercises* sections of the text (*Abstract Algebra* by D. Dummit and R. Foote, 3rd Edition).

- Section 7.4 # 7, 8, 9, 11, 15, 26, 27

- Let R be a commutative ring with identity $1 \neq 0$. Let D be a nonempty subset of R that does not contain 0, does not contain any zero divisors and is closed under multiplication. Let I and J be ideals of R. Prove the following equalities:

  (a) $D^{-1}(I + J) = D^{-1}I + D^{-1}J$;

  (b) $D^{-1}(I \cap J) = D^{-1}I \cap D^{-1}J$.

Note: For Section 7.4 # 26 and # 27 you may assume the results of Section 7.3 # 29 (i.e., that the nilradical of a ring R with identity $1 \neq 0$ is an ideal).