The following is a *non-comprehensive* list of solutions to the computational problems on the homework. For some problems there is a sketch of a solution. On other problems the stated solution may be complete. As always, feel free to ask if you are unsure of the appropriate level of details to include in your own work. Feel free to talk to us about any of the writing intensive problems.

Please let us know if you spot any typos and we'll update things as soon as possible.

1.4.17: Part (a) is actually a proof of the *converse* of the given statement. The last line would more accurately describe what was done if it read, "This is m is odd, then m^2 is odd."

Part (b) is a valid proof of the *contrapositive*, which therefore also proves the original statement.

1.4.18: Part (a) is pretty good, although it wouldn't hurt to specifically state that, in the case $x = 0$, the statement is true; then the rest of the proof describes the other case. Part (b) isn't a valid proof. It's actually a proof of the converse: if $x = 0$ or $y = 0$, then $xy = 0$.

1.4.20(a): This is false. Let $x = \sqrt{2}$ and $y = -\sqrt{2}$. Then x and y are both irrational, but $x + y = 0 \in \mathbb{Q}$.

2.1.3: See answers in the back; ask if you're having trouble sorting out why any of the answers are correct.

2.1.4: (a) $A \cap B = \{6, 8\}$

(b) $A \cup B = \{2, 4, 6, 8, 10\}$

(c) $A \setminus B = \{2, 4\}$

(d) $B \cap C = \{6, 8\}$

(e) $B \setminus C = \{10\}$

(f) $(B \cup C) \setminus A = \{5, 6, 7, 8, 10\} \setminus \{2, 4, 6, 8\} = \{5, 6, 10\}$

(g) $(A \cap B) \setminus C = \{6, 8\} \setminus \{5, 6, 7, 8\} = \emptyset$

(h) $C \setminus (A \cup B) = \{5, 6, 7, 8\} \setminus \{2, 4, 6, 8, 10\} = \{5, 7\}$.

2.1.6: Venn Diagrams can be helpful for figuring these out, although they wouldn't constitute a proof.

(d) $A \cup [B \cap (U \setminus A)] = A \cup [B \cap A^C] = A \cup (B \setminus A) = A \cup B$.

(e) $(A \cup B) \cap [A \cup (U \setminus B)]$ simplifies to A.

2.1.25: These sorts of indexes sets won't be a huge emphasis in this course, but it's worth going through these answers to understand where they came from, and talk to us if you have trouble sorting out one of the parts.

(a) The union is $[1, 2]$. The intersection is $\{1\}$.

(b) The union is $(1, 2)$. The intersection is $\emptyset$.

(c) The union is $[2, \infty)$. The intersection is $\{2\}$.

(d) The union is $[0, 5)$. The intersection is $[2, 3]$.