The average was about 62/100. The True-False was better this time, and the part 5) proofs were good. The proofs for 3) and 4) were weak - make sure to get these [and other problems from HW6] right before the final. The proof outlines below may help.

1)a) Z, b) $s_3 = 2$ etc and $s_8 = 21$, c) for each $x \in F$, exactly one is true: $x = 0$ or $x \in P$ or $-x \in P$, d) $s_n = \sqrt{n}$.

2) FTFTFTFTT; [In every *ordered* field, $0 < 1$. Q is an ordered field, but is not complete. $s_2(n) = n + 2$ misses 0 and 1.]

3-4 A) $[(a, b)][(c, d)] = [(ac + bd, ad + bc)] = [(ca + db, cb + da)] = [(c, d)][(a, b)]$. by def'ns and properties of N.

B) See Morash/HW. (This one is a bit harder than A,C,D).

C) Assume $a \leq b$ and $b \leq c$, so $\exists x, y \in N$ such that $a + x = b$ and $b + y = c$. So, $a + x + y = b + y = c$. Since $x + y \in N$, this shows $a \leq c$.

D) Given $\epsilon > 0$, $\exists K, k \geq K \rightarrow |s_{n_k} - L| < \epsilon/2$. And $\exists N$ such that $n, m > N \rightarrow |s_n - s_m| < \epsilon/2$. Let $k = \max\{K, N\}$. Note $n_k \geq k \geq N$. So, if $m \geq N$ then $|s_m - L| \leq |s_m - s_{n_k}| + |s_{n_k} - L| < \epsilon/2 + \epsilon/2 = \epsilon$.

5 A) Assume $L > M$ to get a contradiction. Let $\epsilon = L - M$. Use the def'n of limit (with $\epsilon/2$) to get $s_n - L > -\epsilon/2$. Then add $L = M + \epsilon$ to both sides, to get a contradiction.

B) Draw $A \times B$ as we did for Q, and a path in it.

C) See Goldberg.