Definitions to know:

1) least upper bound (pg. 23 book / pg. 12 notes)
2) greatest lower bound (pg. 25 book)
3) metric (pg. 34 book / pg. 16 notes)
4) metric space (pg. 34 book / pg. 16 notes)
5) open set (pg. 39 book / pg. 20 notes)
6) relatively open set (pg. 23 notes)
7) closed sets (pg. 40 book / pg. 23 notes)
8) interior of a set (pg. 25 notes)
9) closure of a set (pg. 25 notes)
10) boundary of a set (pg. 26 notes)
11) a bounded set (pg. 43 book)
12) sequence (pg. 11 book / pg. 30 notes)
13) a sequence converging (pg. 45 book / pg. 30 notes)
14) limit point (pg. 55 book / pg. 32 notes)
15) an increasing sequence (pg. 50 book / pg. 33 notes)
16) a decreasing sequence (pg. 50 book / pg. 33 notes)
17) a strictly increasing sequence (pg. 33 notes)
18) a strictly decreasing sequence (pg. 33 notes)
19) a bounded sequence (pg. 47 book / pg. 33 notes)
20) a subsequence (pg. 46 book / pg. 37 notes)
21) $\liminf$ (pg. 38 notes)
22) $\limsup$ (pg. 38 notes)
23) Cauchy sequence (pg. 51 book / pg. 44 notes)
24) complete space (pg. 52 book / pg. 45 notes)
25) compact set (pg. 54 book / pg. 49 notes)

Proofs to know:

1) Pg. 39 book. Pg. 21 notes

Theorem 1. *For any metric space X the following are true:*

i) $\emptyset$ *and* X *are open.*

ii) the union of any collection of open subsets of X *is open.*

iii) the intersection of a finite number of open subsets of X *is open.*

2) Pg. 47 book. Pg. 32 notes.

Theorem 2. *Suppose* X *is a metric space,* $S \subset X$. *A set is closed if and only if every sequence from* S *which converges in* X *actually converges in* S

3) Pg. 50 book. Pg. 32 notes.

Theorem 3. *If* (a_n) *is an increasing sequence from* $\mathbb{R}$, *then* $(a_n)_{n=n_0}^{\infty}$ *converges if and only if it is bounded above. If it is bounded above then it converges to*

$$\sup\{a_n : n \geq n_o\}$$

If it is not bounded above, then it diverges to infinity.

4) Pg. 52 book.

Theorem 4. *A Cauchy sequence that has a convergent subsequence is itself convergent*

5) Pg. 51 book.

Theorem 5. *A convergent sequence is a Cauchy sequence.*

6) Pg. 52 notes.

Theorem 6. *A closed bounded subset of* $\mathbb{R}$ *is compact.*