Home Work 3 (Quizz on October 25th)

Chapter 2 Section 20 Exercises 2, 3, 4, 6, 7
Chapter 2 Section 21 Exercises 1, 2, 4, 6, 10
Chapter 2 Section 22 Exercises 2, 3
Chapter 3 Section 23 Exercises 1, 2, 3, 7, 9, 11
Chapter 3 Section 24 Exercises 2, 3, 5.

Home Work 2 Chapter 2 (Quiz on September 27th)

Sections 12-13 Exercises 2, 3, 4, 6, 8
Sections 14-16 Exercises 2, 3, 4, 6, 8, 9
Section 17 Exercises 2, 3, 5, 6, 9, 11, 13, 18
Section 18 Exercises 2, 4, 5, 6, 10, 12
Section 19 Exercises 2, 5, 7, 8.

Home Work 1 Chapter 1 (Quiz on August 30th)

Section 1 Exercises 2, 10
Section 2 Exercises 2, 5
Section 3 Exercises 5, 6, 12
Section 5 Exercises 1, 4, 5
Section 6 Exercises 2, 5
Section 7 Exercises 1, 3, 4, 5

EXTRA CREDIT:

Credit for *-problems will be given to first 5 persons who will give a correct solution at the board in my office. Then the problem will be removed from the list.

Problem 1*[# of claims left 0](3pts) Can finitely many ”interiors” of parabola cover the plane?

Problem 2*[# of claims left 2](3pts) Let $B$ be a disjoint family of topological figure eights in the plane. Is $B$ necessarily countable?

Problem 3*[# of claims left 4](3pts) Let $B$ be a disjoint family of straight letters $T$ in the plane. Is $B$ necessarily countable?

Problem 4*[# of claims left 2](2pts) Let $C$ be the set of real numbers that are sums of series of the form $\sum_{k=1}^{\infty} a_k \frac{a_k}{3^k}$ with $a_k \in \{0, 2\}$. Prove that $C$ is a closed set in $\mathbb{R}$.

Problem 5*[# of claims left - 4](2pts) What is the maximal number of different sets can be obtained from a subset of the plane by applying
successively the interior and the closure operation to the subset in different orders?

Problem 6*[# of claims left - 5](3pts) Do there exist three disjoint open subsets in $\mathbb{R}$ that have the same boundary?

Problem 7*[# of claims left - 4](3pts) Is every topological group satisfying $T_1$ axiom Hausdorff?

Problem 8*[# of claims left - 5](3pts) Let $A$ and $B$ be subset of a topological group. If $A$ is closed and $B$ is compact, show that $A \cdot B$ is closed.

Problem 9*([# of claims left 5](5pts) Let $G$ be a connected topological group. Prove that if the topology induced on a normal subgroup $H$ of $G$ is discrete, then $H$ is contained in the center of $G$.

Problem 99*[# of claims left 5] Suppose that function $f$ satisfies the following condition: for every $x \in \mathbb{R}$ there is $k \in \mathbb{N}$ such that $f^{(k)}(x) = 0$.

(A)(5pts) Prove that there is an interval $[a, b]$ on which $f$ is a polynomial.

(B)(10pts) Is $f$ a polynomial?