Name: _____

Math 2106 – Exam 3
November 11, 2016

Write clearly in complete sentences using correct terminology. Solutions must be readable from left to right and from top to bottom.

page	1	2	3	writing	total
points					
maximum	10	10	10	1	31

1. Let f be a function from A to B. Let C and D be subsets of A. Prove the following.

   (a) $f(C \cap D) \subseteq f(C) \cap f(D)$

   (b) If f is one-to-one, then $f(C \cap D) = f(C) \cap f(D)$.

2. Prove that $|\mathbb{R} - \mathbb{Z}| = |\mathbb{R}|$.

   List any results from the book, homework, or class discussions that you are using. Write down the full statements.

   Proof:

3. (a) State the three axioms for a set S with binary operation $*$ to be a *group*. (Don't forget the quantifiers!)

(b) Let A be a non-empty set and let $S = \mathcal{P}(A)$. Consider the set union operation

$$\begin{aligned} \cup : S \times S &\to S \\ (X, Y) &\mapsto X \cup Y \end{aligned}$$

Is $(S, \cup)$ a group? Explain your answer.