

**Math 215. Midterm 1**  
Spring 2008, A.Libgober

1. Show that there is a integer  $N$  such that the set of integers

$$\{N, N + 1, N + 2, \dots, N + 10\}$$

contains no primes.

2. Let  $S$  be the set of integers  $N$  such that  $5 \leq N \leq 10$ . How many subsets does  $S$  have? Give a proof to your answer.

3. What is a proof by contradiction? Give an example of a statement which can be proved by contradiction and explain the proof.

4. Let  $A, B$  be arbitrary sets. Show that

$$(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$$

Draw Venn diagram illustrating this identity.

5. Give a definition of a null sequence. Show that the sequence  $\frac{1}{\sqrt{n}}$  is a null sequence.