

Name: _____

Part 1: Definitions and Concepts

1) Let A and B be sets of real numbers. State the definition of union, in the context of A union B . Be precise: vague answers will be given no credit.

2) Let A , B , and C be sets. Draw a Venn Diagram illustrating the region $(A \cap B) - C$.

3) Find the set below.

$$\bigcap_{k=5}^{\infty} \left[1 + \frac{1}{k}, 2 + \frac{1}{k} \right]$$

Part 2: Proofs

4) Prove that for all natural numbers n :

$$\sum_{j=1}^n j \cdot 2^j = 2 + (n-1)2^{n+1}$$