

# Paradox Worksheet

(From the 12th grade *Philosophy of Mathematics* unit)

- Set Name: **Novels** Description: Novels that Mr. York has read  
Members: {*War and Peace, Moby Dick, Tale of Two Cities, Men of Mathematics...*}
- Set Name: **Cities** Description: Cities with a population greater than 5 million.  
Members: {Bombay, Sao Paulo, New York, Paris, Cairo, Tokyo...}
- Set Name: **Prime** Description: Prime numbers  
Members: {2, 3, 5, 7...}
- Set Name: **Non-Prime** Description: Natural numbers that aren't prime  
Members: {1, 4, 6, 8, 9...}
- Set Name: **Two-Digit** Description: All two-digit whole numbers  
Members: {10, 11, 12...}

**Instructions:** First of all, be sure that you understand the above sets. Each set below has the unusual characteristic that its members are themselves sets. You need to fill in each set's members. To simplify matters somewhat, you are only required to consider all of the sets that are defined on this page. The first one has been done for you.

- Set Name: **Number-Sets** Description: Sets that have numbers as members  
Members: {Prime, Non-Prime, Two-Digit}
- 1) Set Name: **23-Sets** Description: Sets that include the number 23  
Members: { }
  - 2) Set Name: **X-Sets** Description: Sets that aren't a member of Number-Sets  
Members: { }
  - 3) Set Name: **N-Sets** Description: Sets having names beginning with "N"  
Members: { }
  - 4) Set Name: **A-Sets** Description: Sets having names beginning with "C"  
Members: { }
  - 5) Set Name: **S-Sets** Description: Sets that *are* members of themselves  
Members: { }
  - 6) Set Name: **R-Sets** (Russell's set!) Description: Sets that *are not* members of themselves  
Members: { }
  - 7) Is S-Sets a member of itself?
  - 8) Is R-Sets a member of itself? (Russell's question!)
  - 9) *The Liar's Paradox.* Is the below statement true or false?  
"This statement is false."
  - 10) *The Barber's Paradox.* Suppose there is a town with just one male barber; and that every man in the town keeps himself clean-shaven: some by shaving themselves, some by attending the barber. It seems reasonable to imagine that the barber obeys the following rule: He shaves all and only those men who do not shave themselves.  
Does the barber shave himself?