Remember - We don't expect that everyone will solve every problem, but we do expect that everyone make a serious attempt at every problem and explain what you tried when you can't solve a problem.

Math 1220, Fall 2017

1) Give an example of:
a) A bounded function $f : \mathbb{R} \to \mathbb{R}$.
b) An unbounded function $f : \mathbb{R} \to \mathbb{R}$.
c) An bounded function $f : [0, 1] \to \mathbb{R}$.
d) An unbounded function $f : [0, 1] \to \mathbb{R}$.

2) The function $g(x) = x^2$ is continuous at every point of $\mathbb{R}$. In Riley's definition of a continuous function, at $x = 1$, what is the value of δ for $\epsilon = 1$? For $\epsilon = 10^{-1}$? For ay $\epsilon > 0$?

3) Define $f : \mathbb{R} \to \mathbb{R}$ by $f(x) = \begin{cases} 1 & x \notin \mathbb{Q} \\ 0 & x \in \mathbb{Q}. \end{cases}$ Prove or disprove: f is continuous at 0.

4) Define $f : \mathbb{R} \to \mathbb{R}$ by $f(x) = \begin{cases} 2x & x \notin \mathbb{Q} \\ 0 & x \in \mathbb{Q}. \end{cases}$ Prove or disprove: f is continuous at 0.