Math 311 Section 01 # Quiz 5 Spring 2018

Name: ______________________________

1. (1 point) __**T**__ True or False: Every bounded sequence of real numbers has a convergent subsequence.
2. (1 point) __**F**__ True or False: If $\lim_{x\to x_0} f(x) = L$ and x_0 is in the domain of f, then $f(x_0) = L$.
3. (1 point) Which of the following limits **do not** exist. Select all that apply.
   - √ $\lim\limits_{x\to 0} \frac{1}{x}$
   - √ $\lim\limits_{x\to 0} \sin(\frac{1}{x})$
   - ○ $\lim\limits_{x\to 0} x\sin(\frac{1}{x})$
   - √ $\lim\limits_{x\to 0} \sin^2(\frac{1}{x})$
   - ○ $\lim\limits_{x\to 0} x$
4. (1 point) Fill in the blanks in the definition of a convergent sequence below:

   "A sequence $\{a_n\}$ of real numbers converges to a real number A if ______________________ $\varepsilon > 0$, ______________________ $N \in J$ such that $n > N$ implies $|a_n - A| < \varepsilon$."

   Solution: A sequence $\{a_n\}$ of real numbers converges to a real number A if **for all** $\varepsilon > 0$, **there exists** $N \in J$ such that $n > N$ implies $|a_n - A| < \varepsilon$.

5. (1 point) Determine the error in the following argument:

   Question 1. *Is it true that there exists an even prime number? Prove your answer.*

   Proof. No, it is not true. A counterexample would be 3, since 3 is prime but not even. □

   Solution: To disprove an existential statement, one must prove a universal statement. A counterexample will not suffice.