

**MAT 136 (Calculus I), Prof. Jim Swift**  
**Worksheet 8: True/False questions about Limits and Continuity**

Recall that “if  $P$ , then  $Q$ ”, also written as “ $P$  implies  $Q$ ” or “ $P \implies Q$ ” means that whenever  $P$  is true,  $Q$  is also true. Another way to say this: “if  $P$  is true, then  $Q$  is true.”

For example, “if an animal is a dog, then it is a mammal” is a true statement.

Note that the converse, “if an animal is a mammal, then it is a dog,” is a false statement.

My cat Chloe is a counter-example for that false statement. “Chloe is a mammal” is true, but “Chloe is a dog” is false.

The existence of Rover the dog does not prove either statement. You cannot prove  $P \implies Q$  with an example like Rover, but you can disprove it with a counter-example like Chloe.

Discuss each of these statements with some classmates. If you can write on your copy of the pdf, circle your answer. Otherwise, make a list of your answers. I will announce the answers near the end of class, with some time for discussion. You do *not* need to turn this in.

1. T / F : If  $f(a)$  is undefined, then  $\lim_{x \rightarrow a} f(x)$  DNE.
2. T / F : If  $\lim_{x \rightarrow a} f(x)$  DNE, then  $f(a)$  is undefined.
3. T / F : If  $f$  is continuous at  $a$ , then  $f(a)$  is defined.
4. T / F : If  $f(a)$  is defined, then  $f$  is continuous at  $a$ .
5. T / F : If  $\lim_{x \rightarrow a} f(x) = L$ , then  $f(a) = L$ . ( $L$  is a real number, so  $L = \infty$  is not allowed.)
6. T / F : If  $f$  is continuous at  $a$  and  $\lim_{x \rightarrow a} f(x) = L$ , then  $f(a) = L$ . ( $L$  is a real number.)
7. T / F : If  $\lim_{x \rightarrow a} f(x)$  DNE, then  $\lim_{x \rightarrow a^+} f(x)$  DNE.
8. T / F : If  $\lim_{x \rightarrow a^-} f(x)$  DNE, then  $\lim_{x \rightarrow a} f(x)$  DNE.