

Math 114 Fall 2017
Calculus I HW 1
Updated Sept 2
Due Wednesday, September 6

1. (a) Find two real numbers that solve $x^2 + 7x + 5 = 0$.
(b) Factor $x^3 - 27$.
2. Based on the graphs below, estimate the following limits:
 - (a) $\lim_{x \rightarrow 1} f(x)$
 - (b) $\lim_{x \rightarrow -2} g(x)$
 - (c) $\lim_{x \rightarrow 1} h(x)$
 - (d) $\lim_{x \rightarrow 1} j(x)$

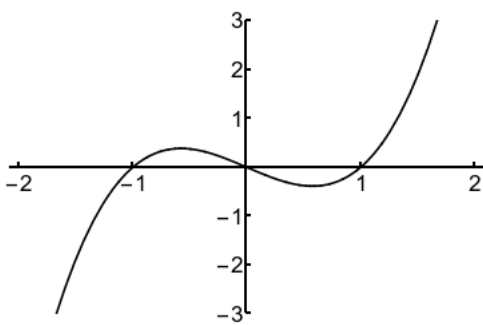


Figure 1: $f(x)$

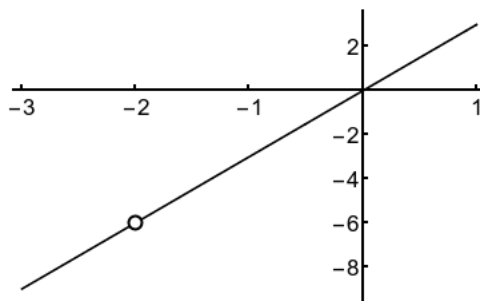


Figure 2: $g(x)$

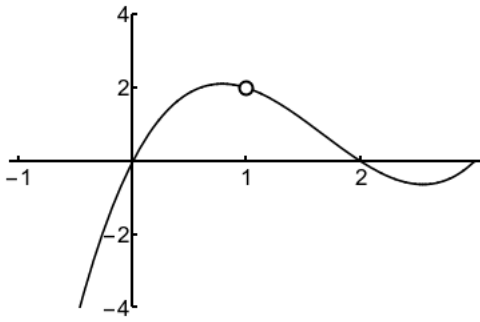


Figure 3: $h(x)$

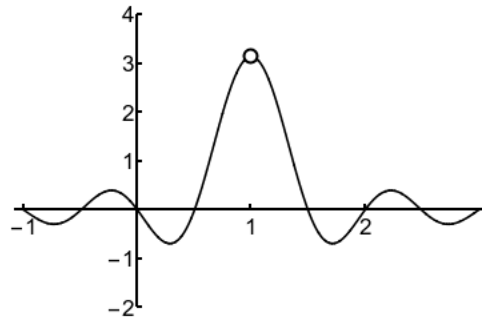


Figure 4: $j(x)$

3. If $|f(x)| \leq |x|$ and $|g(x)| \leq 7 + x^2$, what can we say about $|f(x) + g(x)|$?
4. If $|f(x)| \geq 7$ and $|g(x)| \leq 3$, what can we say about $|f(x) + g(x)|$?
5. ★
 - (a) Find a pair of real numbers x and y such that $|x + y| < |x| + |y|$.
 - (b) Find a pair of real numbers x and y such that $|x + y| = |x| + |y|$.
 - (c) Find a pair of real numbers x and y such that $|x + y| > x + y$.
6. ★
 - (a) Find a pair of real numbers x and y such that $|x + y| > |x| - |y|$.
 - (b) Find a pair of real numbers x and y such that $|x + y| = |x| - |y|$.
 - (c) Find a pair of real numbers x and y such that $|x + y| < x - y$.
7. Let $f(x) = 2x + 1$, and let $L = 3$.
 - (a) Suppose we have an error margin of $\epsilon = 1/10$, that is, we would like the distance between $f(x)$ and L to be less than $1/10$. What open interval does x need to be in to make this happen?
 - (b) Now suppose our error margin is $\epsilon = 1/50$. Give an open interval for x so that the distance between $f(x)$ and L is less than $1/50$ for every x in the interval.