

MATH 251 HOMEWORK 1
DUE OCTOBER 2, 2017.
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Recall that homework is due at the **beginning of class** on the due date.

- (1) §2.1: 2, 4.
- (2) §2.2: 6, 8, 14, 29.
- (3) §2.3: 4, 12, 37.
- (4) Often, it looks from the formula like limits do not exist, but in fact they do. For each of the following first say why it looks like the limit does not exist, then use a computer or calculator to sketch the graph, and then explain why the limit does exist and what it is.
 - (a) $\lim_{x \rightarrow 0} \left(3 + \frac{x^2+1}{x} - \frac{x^2+x}{x^2} \right)$
 - (b) $\lim_{x \rightarrow 1} \left(\frac{2}{x^2-1} - \frac{1}{x-1} + \frac{1}{x+1} \right)$
- (5) Use the squeeze theorem to verify the following limits:
 - (a) $\lim_{x \rightarrow 0} x^2 \cos(1/x) = 0$.
 - (b) $\lim_{x \rightarrow 0} x^2 \sin(1/x) + x^4 + 1 = 1$.
 - (c) $\lim_{x \rightarrow 0} x \sin(1/x) = 0$.
- (6) §2.4: 9, 16, 18, 20, 28, 42.

If you have trouble with a problem, or get help with one, solve a couple of similar ones. (For most of the problems, adjacent-numbered problems are similar.) In fact, you might like to solve a similar, odd-numbered problem *before* solving the assigned one, so you can check your answer to it.

Optional further, challenging-but-interesting problems.

- (1) §2.3: 42, 47, 48, 49.
- (2) §2.4: 49, 51, 53, 54

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