

Quiz 1: The Idea of Limits
§2.1-2.2

MATH 2554 (Calculus I)
due Tues 26 Jan 2016

Directions: This quiz is due on Tuesday, 26 January, 2016 at the beginning of your drill. You may use your brain, notes, book, or other humans to complete your work. **Your solutions must be on a separate sheet of paper, in order, stapled, de-fringed, and legible with your name on the top right corner of the first page.** If you fail to meet any of these requirements, you will receive a zero. Each question is worth one point, and will be graded as correct or not correct (all or nothing).

1. Given the function $f(x) = x - x^3$,
 - (a) determine the slope of the secant line between the following x -coordinates:
 - i. $[1, 1.5]$
 - ii. $[1, 1.05]$
 - iii. $[1, 1.005]$
 - iv. $[1, h]$, assuming $h > 1$
 - (b) then use your answers from (a) to estimate the slope of the tangent line to $f(x)$ at $x = 1$;
 - (c) using the limit symbol, how would you express your conclusion in part (b)?
2. Given the function $w(z) = z^3 - z^2$,
 - (a) make a table of values of the function given the inputs
$$z = 0.9, 0.99, 0.999, 1.1, 1.01, 1.001;$$
 - (b) then use your answers from (a) to “estimate” the value for $w(1)$ (*note, for this particular function you already know the value for $w(1)$ – the point of this exercise is to make sure it is consistent with your answers in part (a)*);
 - (c) using the limit symbol, how would you express your conclusion in part (b)?
3. Sketch the graph of a function satisfying all of the following:
 - $\lim_{x \rightarrow -1} h(x) = 3$
 - $h(5) = 2$
 - $h(-1)$ is undefined
 - $\lim_{x \rightarrow 5^+} h(x) = 0$
4. Given the function
$$g(x) = \begin{cases} 1 + \sin x & \text{if } x < 0 \\ \cos x & \text{if } 0 \leq x \leq \pi \\ \sin x & \text{if } x > \pi \end{cases}$$
 - (a) sketch the graph of $g(x)$, then
 - (b) use the graph to determine the value(s) of a for which $\lim_{x \rightarrow a} g(x)$ does not exist;
 - (c) what are $\lim_{x \rightarrow a^+} g(x)$ and $\lim_{x \rightarrow a^-} g(x)$, where a is your answer(s) from part (b)?