Math 140 Worksheet 2

Week 2 (through Wednesday): Limits (Numerical, Graphical, and Algebraic)

Instructions. Write clear solutions on your own paper. Show enough work to justify your answers. Upload a single PDF of your work to Canvas.

1. **(Numerical limit)** Use the table to estimate $\lim_{x\to 2} \dfrac{x^2-4}{x-2}$.

x	1.9	1.99	2.01	2.1	2.001
$\frac{x^2-4}{x-2}$					

   Compute the five table values and give your best estimate of the limit.

2. **(Algebraic limit)** Evaluate:
$$\lim_{x\to 2} \frac{x^2-4}{x-2}.$$

3. **(One-sided limits)** Let
$$f(x) = \begin{cases} x+2, & x < 1, \\ 3-x, & x \geq 1. \end{cases}$$
   (a) Compute $\lim_{x\to 1^-} f(x)$ and $\lim_{x\to 1^+} f(x)$.
   (b) Does $\lim_{x\to 1} f(x)$ exist? Explain briefly.

4. **(Designing a piecewise function)** Let
$$f(x) = \begin{cases} x^2+b, & x < 1, \\ ax+2, & x \geq 1. \end{cases}$$
   Find a and b so that $\lim_{x\to 1} f(x) = 3$.