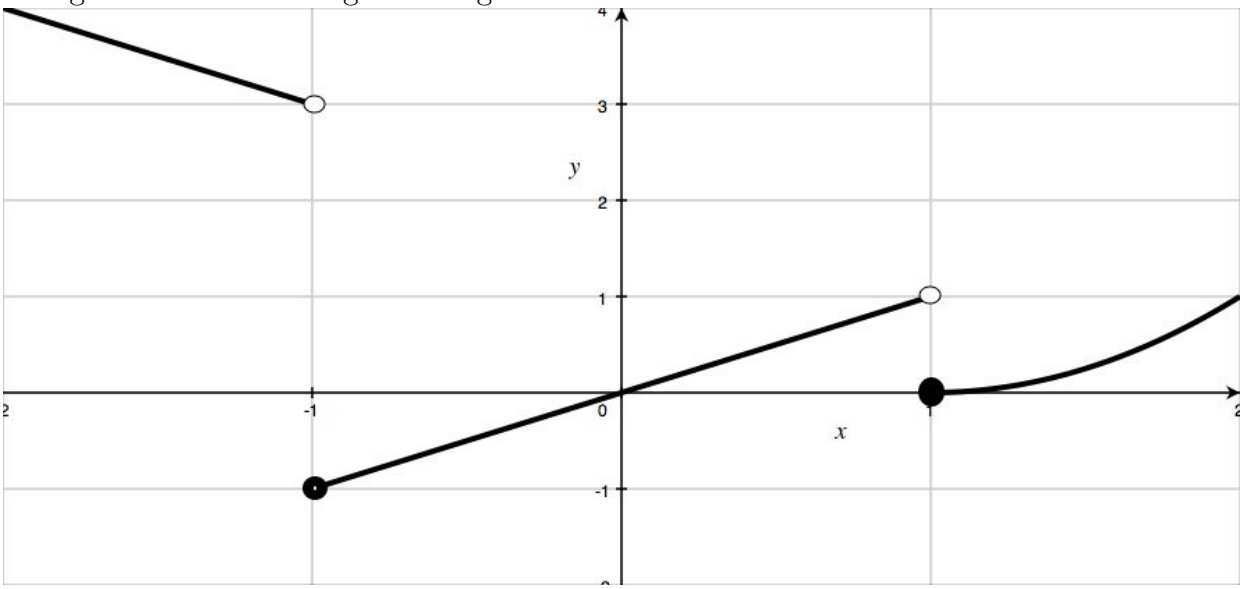
§2.2#12
Math 251

12) Sketch the graph of the following and use it to determine the values of a for which $\lim_{x\to a} f(x)$ exists:

$$f(x) = \begin{cases} 2-x & \text{if } x < -1 \\ x & \text{if } -1 \le x < 1 \\ (x-1)^2 & \text{if } x \ge 1 \end{cases}$$

Answer) To graph piecewise defined function we concentrate on each piece individually. The first part of the rule of f is a line with a slope of -1 and a y-intercept of 2. The second part is a line with slope equal to 1 passing through the origin. The last part is a parabola shifted to the right one unit. Piecing these together we have:



Examining the graph we find $\lim_{x\to a} f(x)$ exists for all x except when x is 1 or -1.