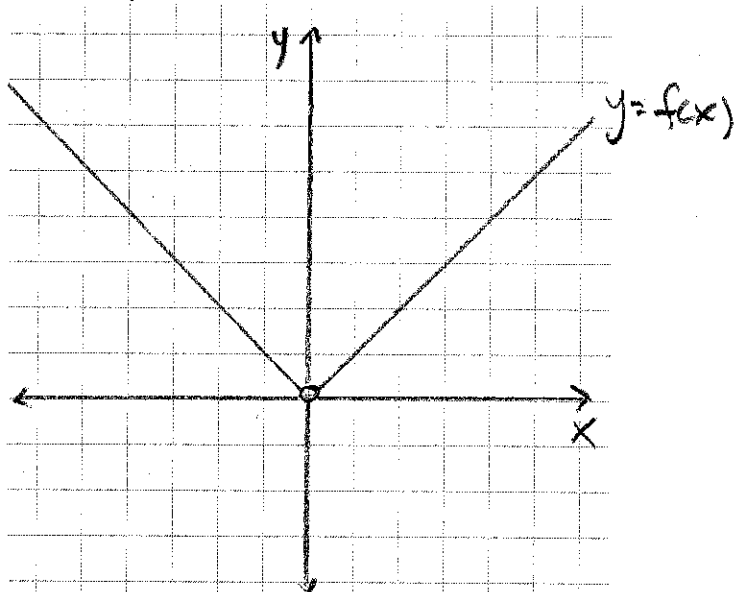


## GRAPHS AND LIMITS

1. Sketch a graph of the function, then use the graph to help find the limits.

$$a) f(x) = \begin{cases} -x & \text{if } x < 0 \\ x & \text{if } x > 0 \end{cases}$$

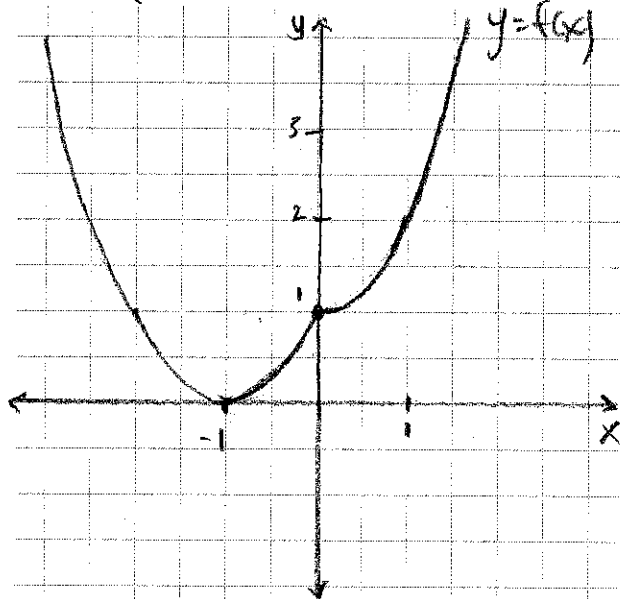


b)  $\lim_{x \rightarrow 0} f(x) = 0$

c) Is  $f(0)$  defined? **NO**

2. Sketch a graph of the function, then use the graph to answer questions about the limits of the function.

$$a) f(x) = \begin{cases} (x+1)^2 & \text{if } x \leq 0 \\ x^2 + 1 & \text{if } x > 0 \end{cases}$$



b)  $\lim_{x \rightarrow -1} f(x) = 0$

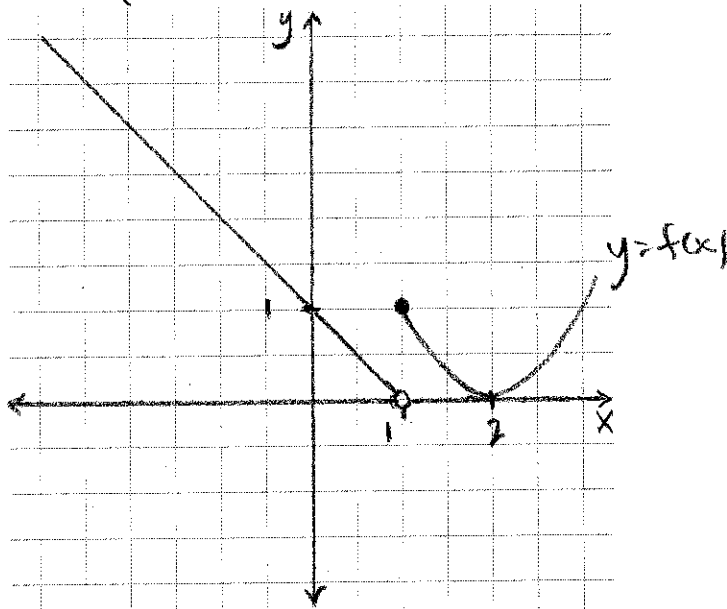
c)  $\lim_{x \rightarrow 0^-} f(x) = 1$

d)  $\lim_{x \rightarrow 0^+} f(x) = 1$

} agree, so  $\lim_{x \rightarrow 0} f(x) = 1$

3. Sketch a graph of the function, then use the graph to answer questions about the limits of the function.

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



b)  $\lim_{x \rightarrow 0} f(x) = 1$

c)  $\lim_{x \rightarrow 1^-} f(x) = 0$

d)  $\lim_{x \rightarrow 1^+} f(x) = 1$

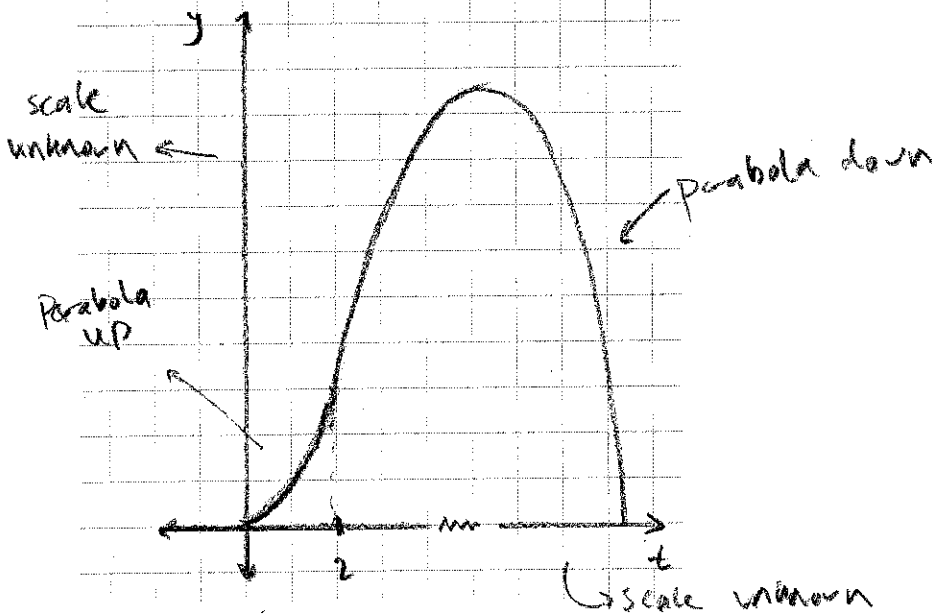
} different, so  $\lim_{x \rightarrow 1} f(x)$  DNE

4. The altitude of a model rocket (in meters)  $t$  seconds after launch is given by

$$h(t) = \begin{cases} 40t^2 & \text{if } t \leq 2 \\ 160 + 160(t-2) - 4(t-2)^2 & \text{if } t > 2 \end{cases}$$

a) Why do you think this is a piecewise function? *The rocket fires for 2 seconds, then gravity takes over.*

b) Sketch a graph of the rocket's height for  $t \geq 0$ .



c) Is  $h(t)$  continuous? Should it be continuous?

*It is continuous. Yes it should be: motion is usually continuous (no teleportation).*