KEY

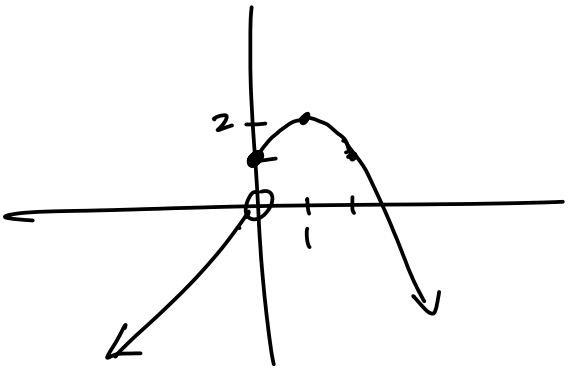
**Unit 4 Group Work 1**
**PCHA 2022-23 / Dr. Kessner**

**No calculator! Have fun!**

**1.** Let

$$f(x) = \begin{cases} x & \text{if } x < 0 \\ 2 - (x-1)^2 & \text{if } x \geq 0 \end{cases}$$

a) Sketch the graph of $f(x)$.




b) On what intervals is $f$ increasing and/or decreasing? Is $f$ bounded? Does it have any local or global maxima or minima?

increasing on $(-\infty, 0)$ and $[1, 2)$
decreasing on $[1, \infty)$

c) Does $f$ have any discontinuities? Where, and what type?

jump discontinuity at $x = 0$

d) Describe the end behavior of $f$ using limits.

$\lim_{x \to -\infty} f(x) = -\infty$

$\lim_{x \to \infty} f(x) = -\infty$

**2.** Consider the same function from the previous problem.

$$f(x) = \begin{cases} x & \text{if } x < 0 \\ 2 - (x-1)^2 & \text{if } x \geq 0 \end{cases}$$

Sketch the graphs of the following transformed functions:

- $p(x) = f(-x)$
- $q(x) = f(|x|)$
- $r(x) = |f(|x|)|$
- $s(x) = |f(-x)|$
- $t(x) = -f(-|x|)$