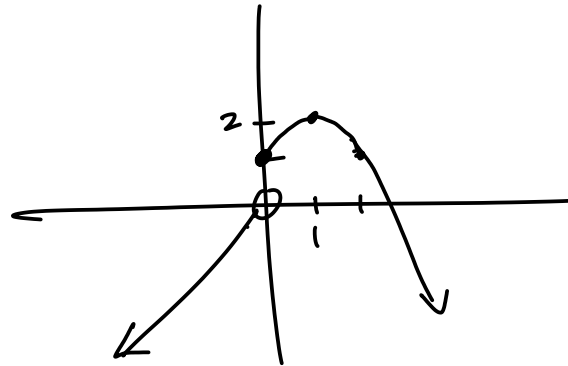KEY

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 $[0, 1)$
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.

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

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

1

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:

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

f(x)

$p(x) = f(-x)$

$s(x) = |f(-x)|$

$|f(-x)|$

$f(-x)$

$q(x) = f(|x|)$

$t(x)$

$t(x) = -f(-|x|)$

$f(-|x|)$

$r(x) = |q(x)|$

2