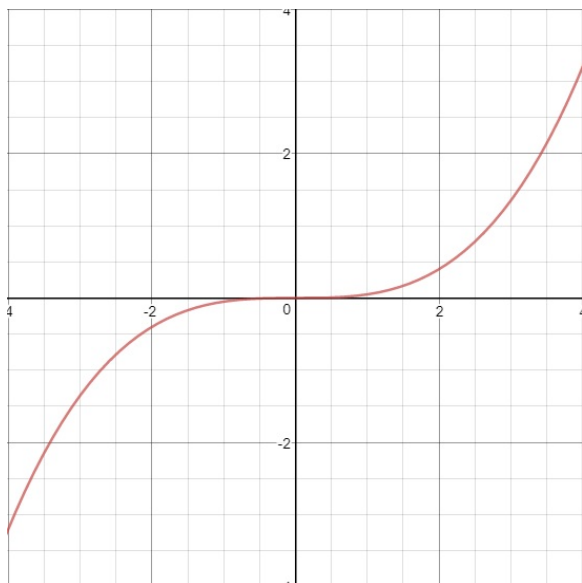


# Lesson 21 Worksheet

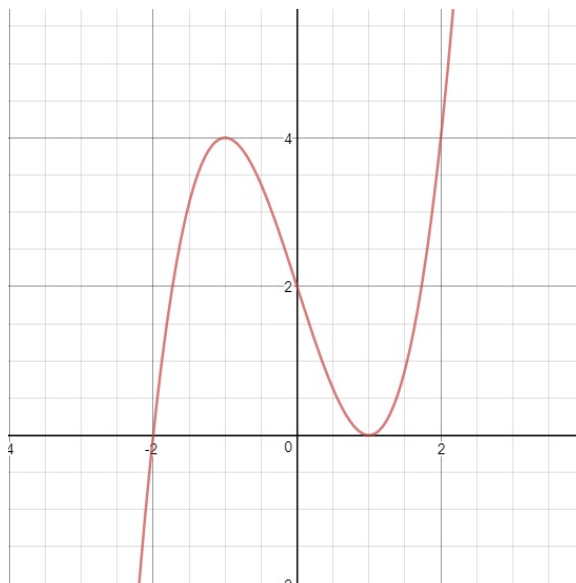
October 18, 2017

Given the following graphs of the **derivative**  $f'(x)$ , determine where  $f(x)$  is increasing and decreasing, concave up and concave down.

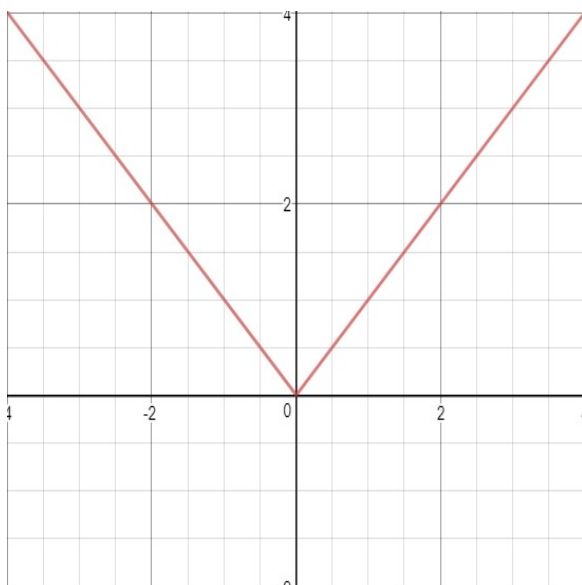
1.



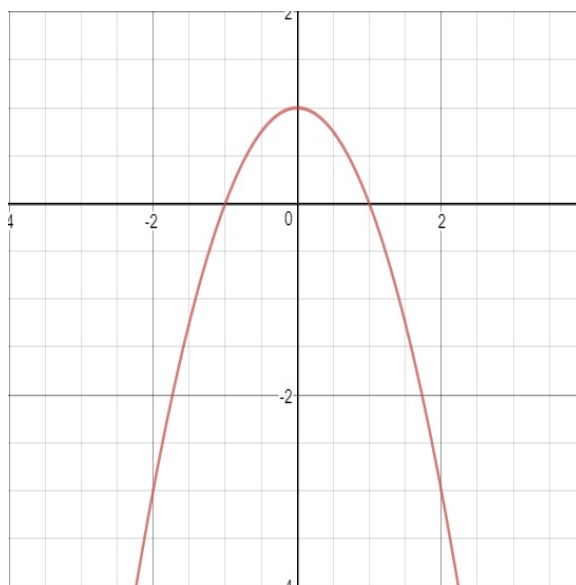
3.



2.



4.



**Answers:**

1. Increasing  $(0, \infty)$ ; decreasing  $(-\infty, 0)$ ; concave up  $(-\infty, \infty)$ ; never concave down
2. Increasing  $(-\infty, \infty)$  (with a critical point at  $x = 0$ ); never decreasing; concave up  $(0, \infty)$ ; concave down  $(-\infty, 0)$
3. Increasing  $(-2, 1)$ ; decreasing  $(-\infty, -2) \cup (1, \infty)$ ; concave up  $(-\infty, -1) \cup (1, \infty)$ ; concave down  $(-1, 1)$
4. Increasing  $(-1, 1)$ ; decreasing  $(-\infty, -1) \cup (1, \infty)$ ; concave up  $(-\infty, 0)$ ; concave down  $(0, \infty)$