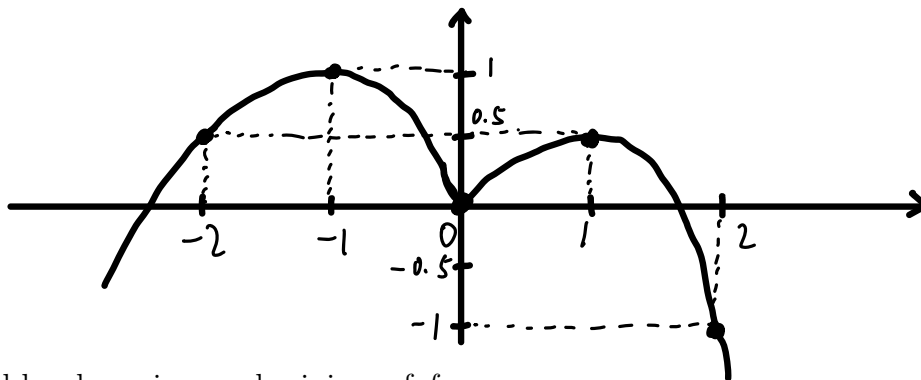


**Problem 1.** Find the linear approximation of the function  $f(x) = x^{1/3}$  at  $x = 8$ . Use it to estimate  $8.01^{1/3}$ .

**Problem 2.** The side length of a cube is measured as  $4 \pm 0.02\text{m}$ . Estimate the propagated error for its volume using the differential form of derivative.

**Problem 3.** The graph of  $f(x)$  is given as below.



(1) Find all local maxima and minima of  $f$ .

(2) Determine whether the global maximum and minimum of  $f$  on  $(-2, 2)$  exist. If yes, find it.

**Problem 4.** Find the global maximum and minimum of  $f(x) = x^3 - 2x^2 + x + 1$  on  $[0, 2]$ .