

# INTRODUCTION TO CALCULUS

MATH 1A

## UNIT 13: WORKSHEET

**Problem 1:** We study here the function  $f(x) = 2x^3 - 3x^2$  on the interval  $[-1, 2]$ .

a) Find all the critical points of  $f$ . They are all nice integers.

**Solution:**

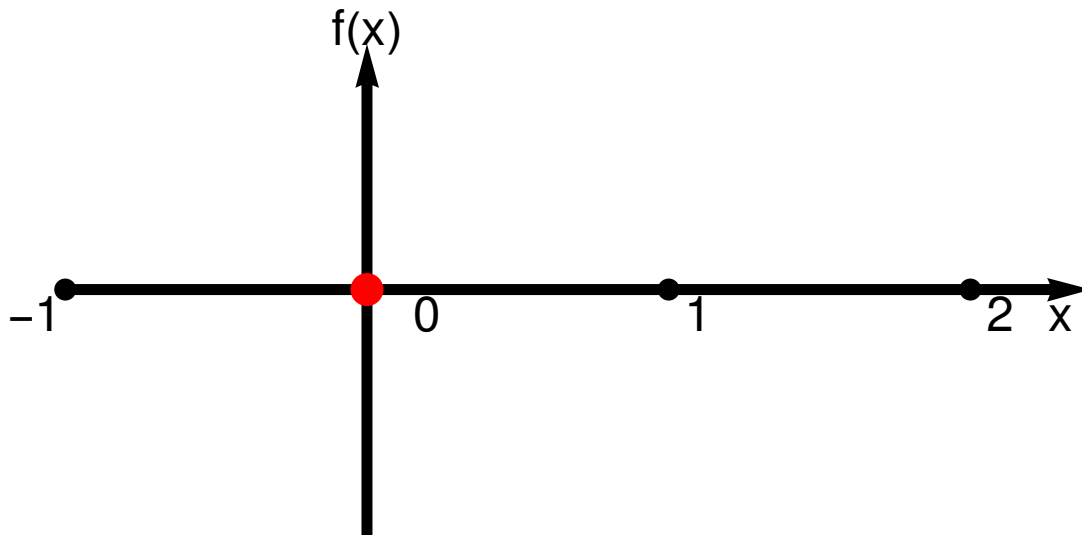
The critical points are 0,1

b) Use the second derivative test to find the local maxima and minima on  $(-1, 2)$ .

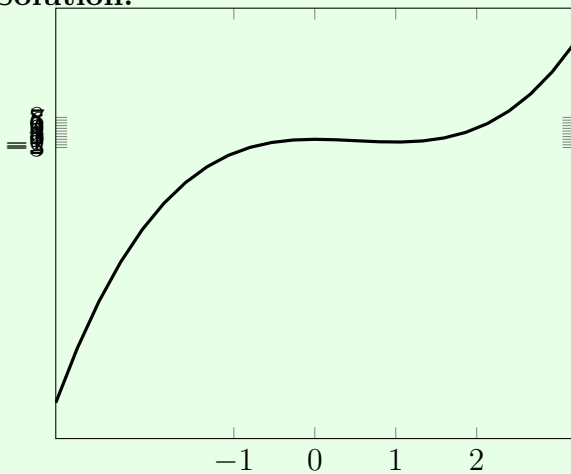
**Solution:**

The second derivative is  $12x - 6$ . This is negative at  $x = 0$  and positive at  $x = 1$ . The point  $x = 0$  is a maximum. The point  $x = 1$  is a minimum.

c) Use the information you have to sketch a graph of  $f$ .



Solution:



d) Check the first derivative test.

Solution:

The function is increasing from  $(-\infty, 0)$  and  $(1, \infty)$ . The function is decreasing on  $(0, 1)$ .

e) Find the global maxima and minima.

**Solution:**

We have to check the point  $0, 1$  as well as the boundary points  $-1, 2$ . The function value at  $x = 2$  is largest. The function value at  $x = -1$  is smallest.  $2$  is a global maximum.  $-1$  is a global minimum.