finding the absolute extrema


example

maximal value is at $x = 1$

minimal value is at $x = 3$

finding the absolute extrema

example

Find the absolute maximum and minimum values of $f(x) = 3x - x^3$ on the interval $[-1,3]$.

1. Find the critical points:

   $f'(x) = 3 - 3x^2 = 3(1 - x^2)$

   $f'(x) = 0$ when $x = \pm 1$, these are the critical points

2. Make a table with the critical points inside the interval and its endpoints:

x	$3x - x^3$	
1	$3 - 1 = 2$	maximal value is at $x = 1$
-1	$-3 - (-1) = -2$	
3	$3 \cdot 3 - 3^3 = -18$	minimal value is at $x = 3$

finding the absolute extrema

exercise 1

Find the absolute maximum and minimum value of $f(x) = 10x(2 - \ln x)$ on the interval $[1, e^2]$.