

MATH 1420: WORKSHEET FOR SECTION 4.3
EXTREME VALUES

Consider the function

$$f(x) = -\frac{x^3}{3} + 2x^2 + 5x + 1.$$

- (1) Use a graphing calculator or online tool like Desmos.com to graph $f(x)$ on the interval $[-6, 6]$. Visually locate the critical points of $f(x)$ and determine where you think the absolute maximum and minimum are in this interval.
- (2) Numerically determine the critical points of $f(x)$ in the interval $[-6, 6]$ by calculating its derivative and finding where $f'(x) = 0$.
- (3) Determine the absolute maximum and absolute minimum of $f(x)$ on the interval $[-6, 6]$.
- (4) If you were instead trying to find the absolute maximum and minimum of $f(x)$ on the interval $[0, 6]$, what if anything would be different?

Find the absolute maximum and minimum of each function on the specified interval. If one or both doesn't exist, explain why.

(1) $g(t) = e^{-t^2/2}$, on $[-1, 2]$.

(2) $h(t) = \frac{t^2 + 1}{t + 1}$, on $[0, 3]$.

(3) $h(t) = \frac{t^2 + 1}{t + 1}$, on $[-4, -1]$.

(4) $j(x) = \ln(\cos(x) + 2)$, on $[0, 2\pi]$.