MAC 2311 Recitation 3/19/21 Notes

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1 Problems

Definition: Let $A \subseteq \mathbb{R}$ and let $f : A \to \mathbb{R}$. We say that f has an **absolute maximum** on A if there is a point $x^* \in A$ such that,

$$f\left(x^*\right) \geq f(x) \quad \text{for all} \quad x \in A$$

We say that f has an **absolute minimum** on A if there is a point $x_* \in A$ such that,

$$f\left(x_*\right) \leq f(x) \quad \text{for all} \quad x \in A$$

We say that x^* is an **absolute maximum point** for f on A, and that x_* is an **absolute minimum point** for f on A, if they exist.

Definition: Let $c \in \mathbb{R}$ and $\delta > 0$. Then the **δ-neighborhood** of c is the set $V_\delta(c) := \{x \in \mathbb{R} : |x - c| < \delta\}$.

Definition: $f : I \to \mathbb{R}$ is said to have a **local maximum** at $c \in I$ if there exists a neighborhood $V := V_\delta(c)$ of c such that $f(x) \leq f(c)$ for all x in $V \cap I$.

$f : I \to \mathbb{R}$ is said to have a **local minimum** at $c \in I$ if there exists a neighborhood $V := V_\delta(c)$ of c such that $f(c) \leq f(x)$ for all x in $V \cap I$.

We say that f has a **local extremum** at $c \in I$ if it has either a local maximum or a local minimum at c.

Definition: A function $y = f(x)$ has **critical points** at all points x_0 where $f'\left(x_0\right) = 0$ or $f'\left(x_0\right)$ is not differentiable.

Definition L'Hospital's Rule: Let $-\infty \leq a < b \leq \infty$ and let f, g be differentiable on (a, b) such that $g'(x) \neq 0$ for all $x \in (a, b)$. Suppose that,

$$\lim_{x \to a+} f(x) = \lim_{x \to a+} g(x) = 0 \text{ or } \pm\infty$$

If $\displaystyle\lim_{x \to a+} \frac{f'(x)}{g'(x)}$ exists, then,

$$\lim_{x \to a+} \frac{f(x)}{g(x)} = \lim_{x \to a+} \frac{f'(x)}{g'(x)}$$

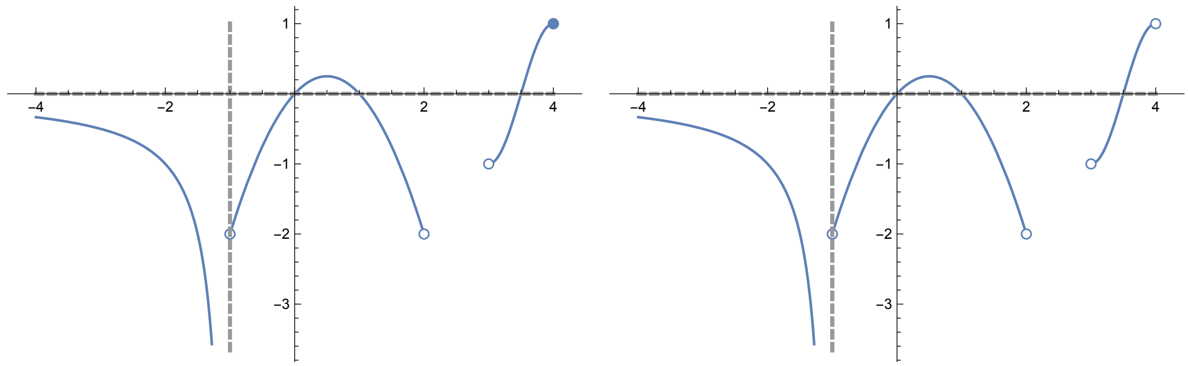

Figure 1: