**WORKSHEET 11**

MATH 101

*Fulbright University, Ho Chi Minh City, Vietnam*

## Approximations

**Question 1.** *From the video of 3Blue1Brown, summarize what is Taylor series? A reference for Taylor series is here:* https://tutorial.math.lamar.edu/classes/calcii/taylorseries.aspx

**Question 2.** *Find the Taylor series for the following functions:*

*(1)* $\sin(x)$

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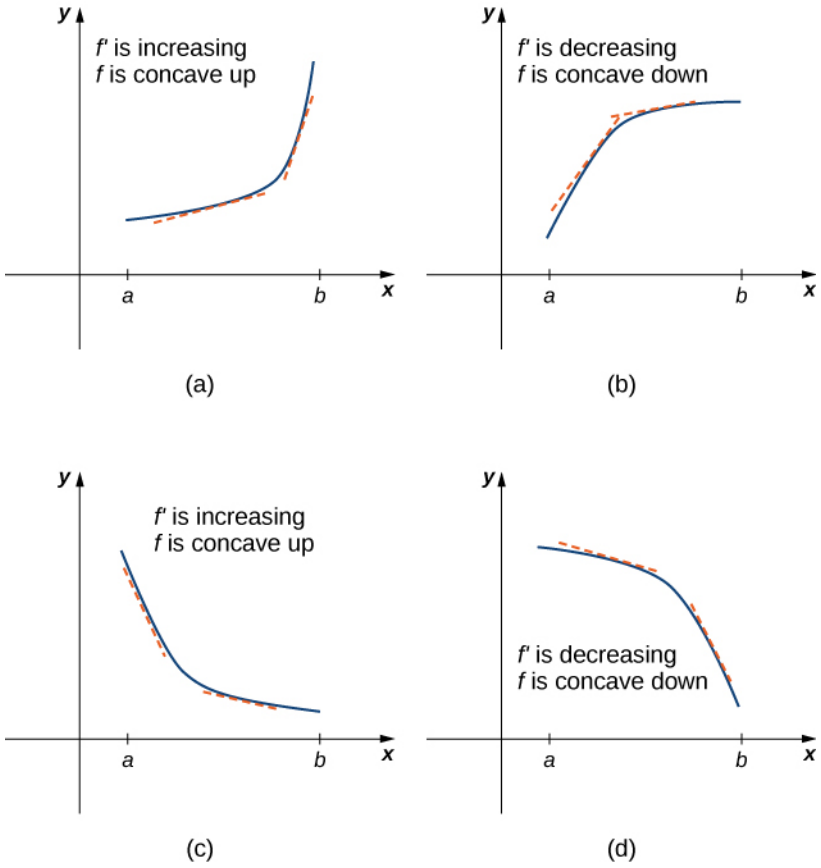
*(2)* $e^x$

*(3)* $\ln(1+x)$

## Optimization

The meaning of second derivative is that it tells us about the concavity of the graph of a function.




**Definition 1.** Let $f$ be a function defined over an interval $I$ and let $c \in I$. We say $f$ has an absolute maximum on $I$ at $c$ if $f(c) \geqslant f(x)$ for all $x \in I$. We say $f$ has an absolute minimum on $I$ at $c$ if $f(c) \leqslant f(x)$ for all $x \in I$. If $f$ has an absolute maximum on $I$ at $c$ or an absolute minimum on $I$ at $c$, we say $f$ has an absolute extremum on $I$ at $c$.

**Theorem 1.** *If $f$ is a continuous function over the closed, bounded interval $[a, b]$, then there is a point in $[a, b]$ at which $f$ has an absolute maximum over $[a, b]$, and there is a point in $[a, b]$ at which $f$ has an absolute minimum over $[a, b]$.*