Jensen's inequality

Property

Continuous Function with real numbers

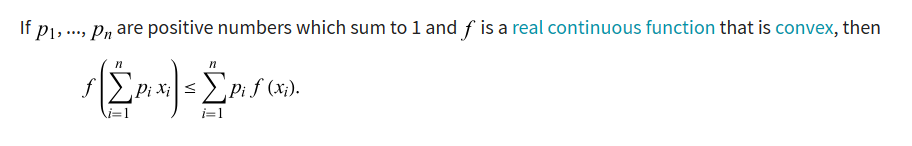
Convex Function

Subject to:

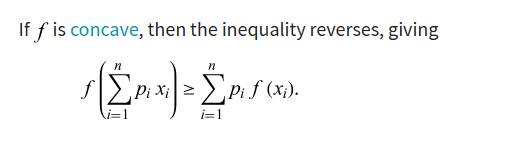
==

For continuous convex functions .

Concave Function

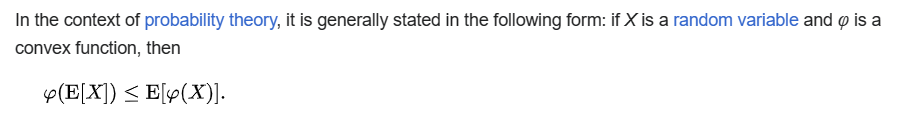


For continuous concave functions, the inequality reverses.



Continuous Function to Random variable

For any random variable X and f is a convex function, one will apply that:

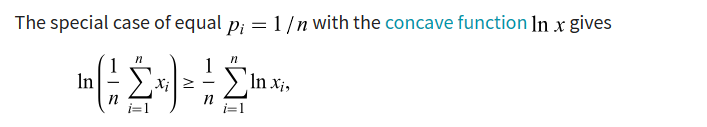


Proof:

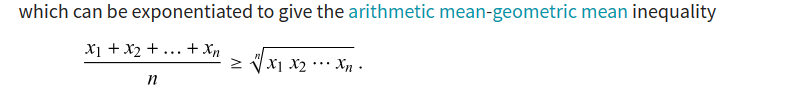
See Wiki.

Special case

natural logarithm



AM-GM





Proof

natural logarithm

Suppose

Since = is a concave function, we have that

=>

AM-GM

Continue the previous proof of property, we can imply that

=>

=>

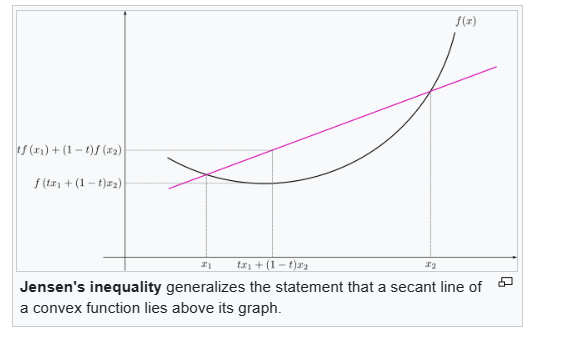
=

=

=

Hence proved.

Graph



Ref

[Jensen's inequality - Wikipedia](https://en.wikipedia.org/wiki/Jensen%27s_inequality)

[Jensen's Inequality -- from Wolfram MathWorld](https://mathworld.wolfram.com/JensensInequality.html)