**Hermite-Hadamard integral inequality**

If is convex, then

**Proof**: First of all, let's recall that a convex function on a open interval is continuous on and admits left and right derivative and for any . For this reason, it's always possible to construct at least one supporting line for at any : if is differentiable in , one has ; if not, it's obvious that all are supporting lines for any .

Let now be a supporting line of in . Then, . On the other side, by convexity definition, having defined the line connecting the points and , one has . Shortly,

Integrating both inequalities between and

Now

and

Using above value in (1), we have

which is the thesis.