Examples 0.0.1 (Conditional Jensen's inequality (Theorem 1.5.2)). Conditional Jensen's inequality can come handy when dealing with martingales. For example, if S is a martingale, then the process $(S - K)^+$ is a submartingale, as $f : x \mapsto (x - K)^+$ is convex:

$$\mathbb{E}[f(S_t)|\mathcal{F}_s] \geq f(\mathbb{E}[S_t|\mathcal{F}_s]) = f(S_s),$$

for $0 \leq s \leq t \leq T$. Similarly we can show that (S^2) is also a submartingale.