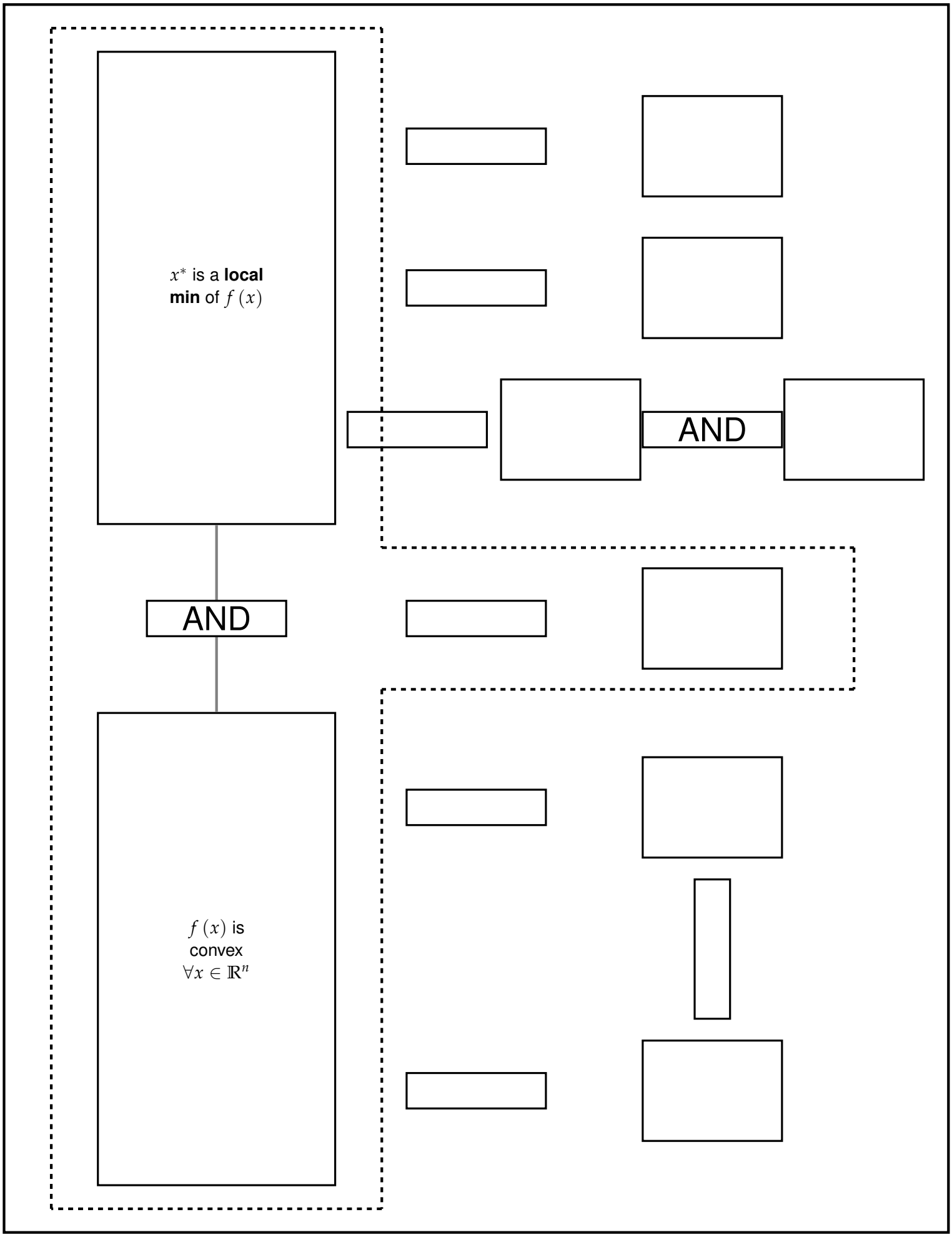
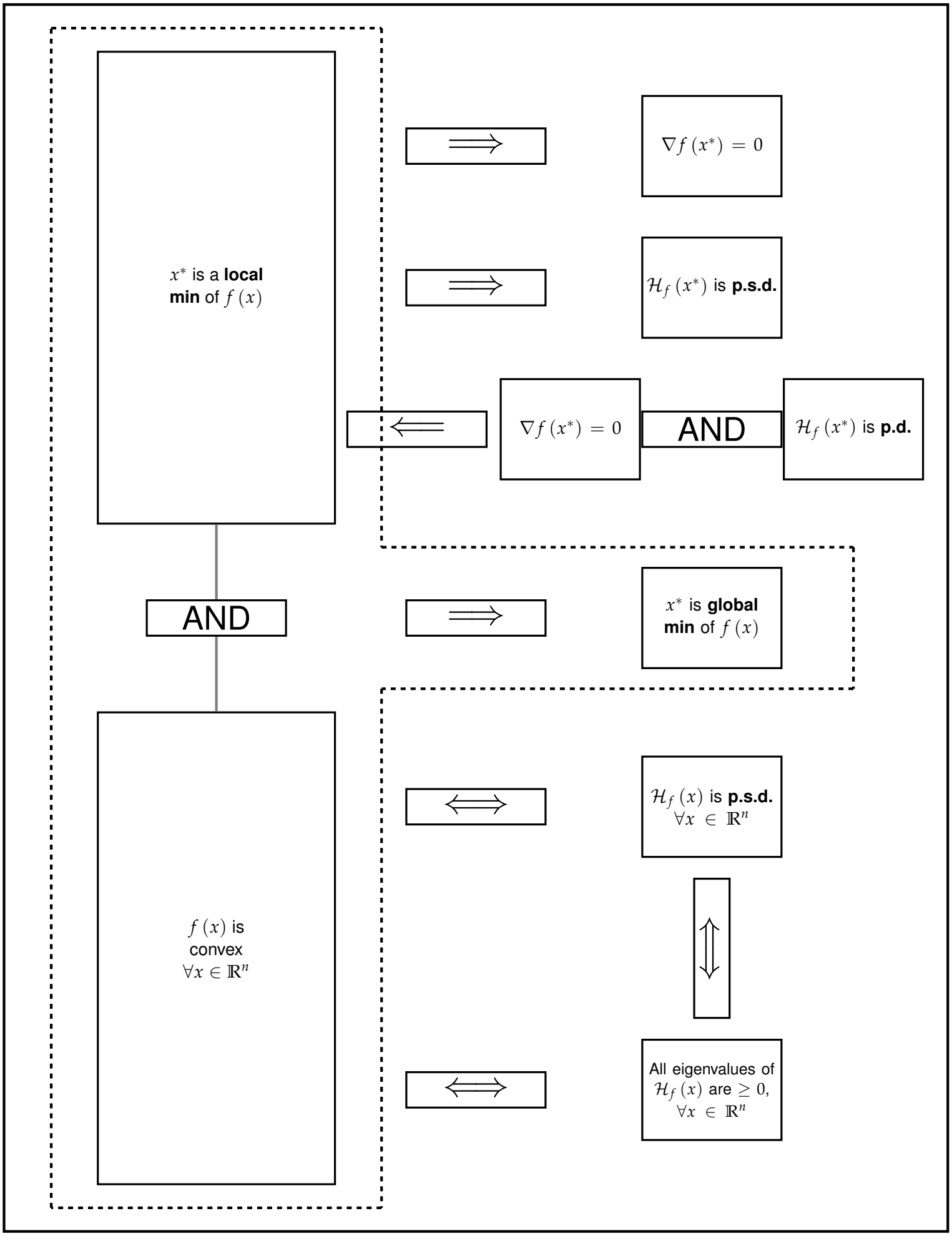

x^* is a **local min** of $f(x)$
AND
$f(x)$ is convex $\forall x \in \mathbb{R}^n$
AND


x^* is a **local min** of $f(x)$
$\Longrightarrow$
$\nabla f(x^*) = 0$
$\Longrightarrow$
$\mathcal{H}_f(x^*)$ is **p.s.d.**
$\Longleftarrow$
$\nabla f(x^*) = 0$
AND
$\mathcal{H}_f(x^*)$ is **p.d.**
AND
$\Longrightarrow$
x^* is **global min** of $f(x)$
$f(x)$ is convex $\forall x \in \mathbb{R}^n$
$\Longleftrightarrow$
$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$
$\Longleftrightarrow$
All eigenvalues of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$

$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$
$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$
$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$	$\Longleftrightarrow$
$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$
$\Longleftarrow$	$\Longleftarrow$	$\Longleftarrow$	$\Longleftarrow$	$\Longleftarrow$	$\Longleftarrow$
$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$
$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$	$\Longrightarrow$
x^* is **global min** of $f(x)$	x^* is **global min** of $f(x)$	x^* is **global min** of $f(x)$	x^* is **global min** of $f(x)$	x^* is **global min** of $f(x)$	x^* is **global min** of $f(x)$
$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$	$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$	$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$	$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$	$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$	$\mathcal{H}_f(x)$ is **p.s.d.** $\forall x \in \mathbb{R}^n$
All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$	All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$	All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$	All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$	All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$	All λ_i of $\mathcal{H}_f(x)$ are ≥ 0, $\forall x \in \mathbb{R}^n$
$\mathcal{H}_f(x^*)$ is **p.d.**	$\mathcal{H}_f(x^*)$ is **p.d.**	$\mathcal{H}_f(x^*)$ is **p.d.**	$\mathcal{H}_f(x^*)$ is **p.d.**	$\mathcal{H}_f(x^*)$ is **p.d.**	$\mathcal{H}_f(x^*)$ is **p.d.**
$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$
$\mathcal{H}_f(x^*)$ is **p.s.d.**	$\mathcal{H}_f(x^*)$ is **p.s.d.**	$\mathcal{H}_f(x^*)$ is **p.s.d.**	$\mathcal{H}_f(x^*)$ is **p.s.d.**	$\mathcal{H}_f(x^*)$ is **p.s.d.**	$\mathcal{H}_f(x^*)$ is **p.s.d.**
$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$	$\nabla f(x^*) = 0$