Halfspaces

1 Why

TODO

2 Definition

For a nonzero $b \in \mathbf{R}^n$ and $\beta \in \mathbf{R}$ the sets

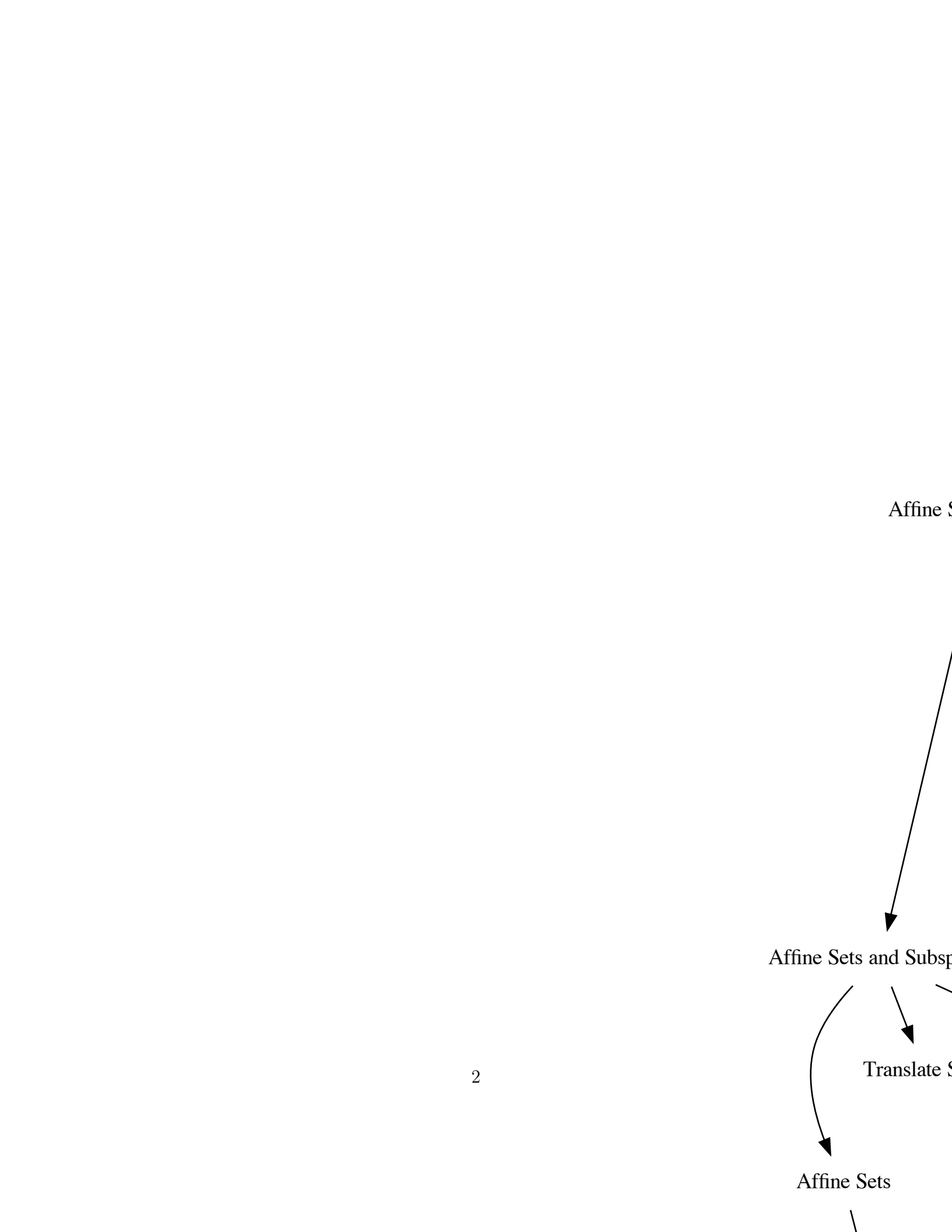
$$\{x \in \mathbf{R}^n \mid \langle x, b\rangle \leq \beta\}, \quad \{x \in \mathbf{R}^n \mid \langle x, b\rangle \geq \beta\},$$

are *closed halfspaces* and the sets

$$\{x \in \mathbf{R}^n \mid \langle x, b\rangle \leq \beta\}, \quad \{x \in \mathbf{R}^n \mid \langle x, b\rangle \geq \beta\},$$

are *open halfspaces*.

Each of these is nonempty and convex. As with hyperplanes, the same four sets appear if one uses $\lambda\beta$ and λb above, so the halfspaces de-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