# Sample document

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Template to write quick and dirty latex
TODO: a sample todo task
TODO
$\widetilde{\mathbb{P}}(x) \neq \widetilde{\mathbb{Q}}(x)$

$$\boldsymbol{abcde} * \boldsymbol{ghijkl} * \boldsymbol{nopqrstuvwxyz} \tag{1}$$

$$\boldsymbol{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \tag{2}$$

$$\widetilde{A}\widetilde{B}\widetilde{C}\widetilde{D}\widetilde{E}\widetilde{F}\widetilde{G}\widetilde{H}\widetilde{I}\widetilde{J}\widetilde{K}\widetilde{L}\widetilde{M}\widetilde{N}\widetilde{O}\widetilde{P}\widetilde{Q}\widetilde{R}\widetilde{S}\widetilde{T}\widetilde{U}\widetilde{V}\widetilde{W}\widetilde{X}\widetilde{Y}\widetilde{Z} \tag{3}$$

$$\widehat{A}\widehat{B}\widehat{C}\widehat{D}\widehat{E}\widehat{F}\widehat{G}\widehat{H}\widehat{I}\widehat{J}\widehat{K}\widehat{L}\widehat{M}\widehat{N}\widehat{O}\widehat{P}\widehat{Q}\widehat{R}\widehat{S}\widehat{T}\widehat{U}\widehat{V}\widehat{W}\widehat{X}\widehat{Y}\widehat{Z} \tag{4}$$

$$\left\| \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 & 7 \\ & & \vdots & & \\ 13 & 14 & 15 & 16 & 17 \end{bmatrix} \right\|_F \tag{norm}$$

$$\left\| \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \end{bmatrix} \right\| \tag{spectral norm}$$

Multiline equation with a single label, with anchors "&"

$$\begin{aligned} \Xi_t =& \frac{\eta_w}{2} \left\| \nabla_W \mathcal{L}_t \right\|^2 + \frac{1}{2\eta_w} \left\| W_t - W^* \right\|^2 - \frac{1}{2\eta_w} \left\| W_{t+1} - W^* \right\|^2 \\ &+ \frac{\eta_v}{2} \left\| \nabla_V \mathcal{L}_t \right\|^2 + \frac{1}{2\eta_v} \left\| V_t - V^* \right\|^2 - \frac{1}{2\eta_v} \left\| V_{t+1} - V^* \right\|^2 \end{aligned} \tag{5}$$

Multiline equation with a single label, without anchors "&"

$$\begin{aligned} \frac{1}{2} \sum_{t=0}^{T-1} \left\| \hat{f}_t(x_t) - c^*(x_t) \right\|^2 - 2 \sum_{t=0}^{T-1} \left( \left\| \Delta_t(x_t) \right\|^2 + \left\| c^*(x_t) - y_t \right\|^2 \right) \quad &\leq \quad \sum_{t=0}^{T-1} \Xi_t \\ \leq \quad \frac{\eta_w}{2} \sum_{t=0}^{T-1} \left\| \nabla_W \mathcal{L}_t \right\|^2 + \frac{\eta_v}{2} \sum_{t=0}^{T-1} \left\| \nabla_V \mathcal{L}_t \right\|^2 &+ \frac{1}{2\eta_w} \left\| W^* - W^{(0)} \right\|^2 + \frac{1}{2\eta_v} \left\| V^* - V^{(0)} \right\|^2 \end{aligned} \tag{6}$$

Multiple equations gathered in a single block (like `align` but centered instead of right-aligned by default, an no anchors "&" allowed)

$$z_t = (x_t, y_t) \tag{7}$$
$$z_{<t} = (z_0, ..., z_{t-1}) \tag{8}$$
$$z'_t = (x'_t, y'_t) \tag{9}$$

Move the first line to the left

$$\frac{1}{\eta_w T} \sum_{t=0}^{T-1} \left( \|W_t - W^*\|^2 - \mathbb{E}_{z'_t} \left\|W'_{t+1} - W^*\right\|^2 \right) \tag{10}$$
$$= \frac{2}{T} \sum_{t=0}^{T-1} \mathbb{E}_{z'} \left\langle \hat{f}_t(x') - y', p_{w,t}(W_t - W^*; x') \right\rangle - \frac{1}{\eta_w T} \sum_{t=0}^{T-1} \left\|W'_{t+1} - W_t\right\|^2 \tag{11}$$