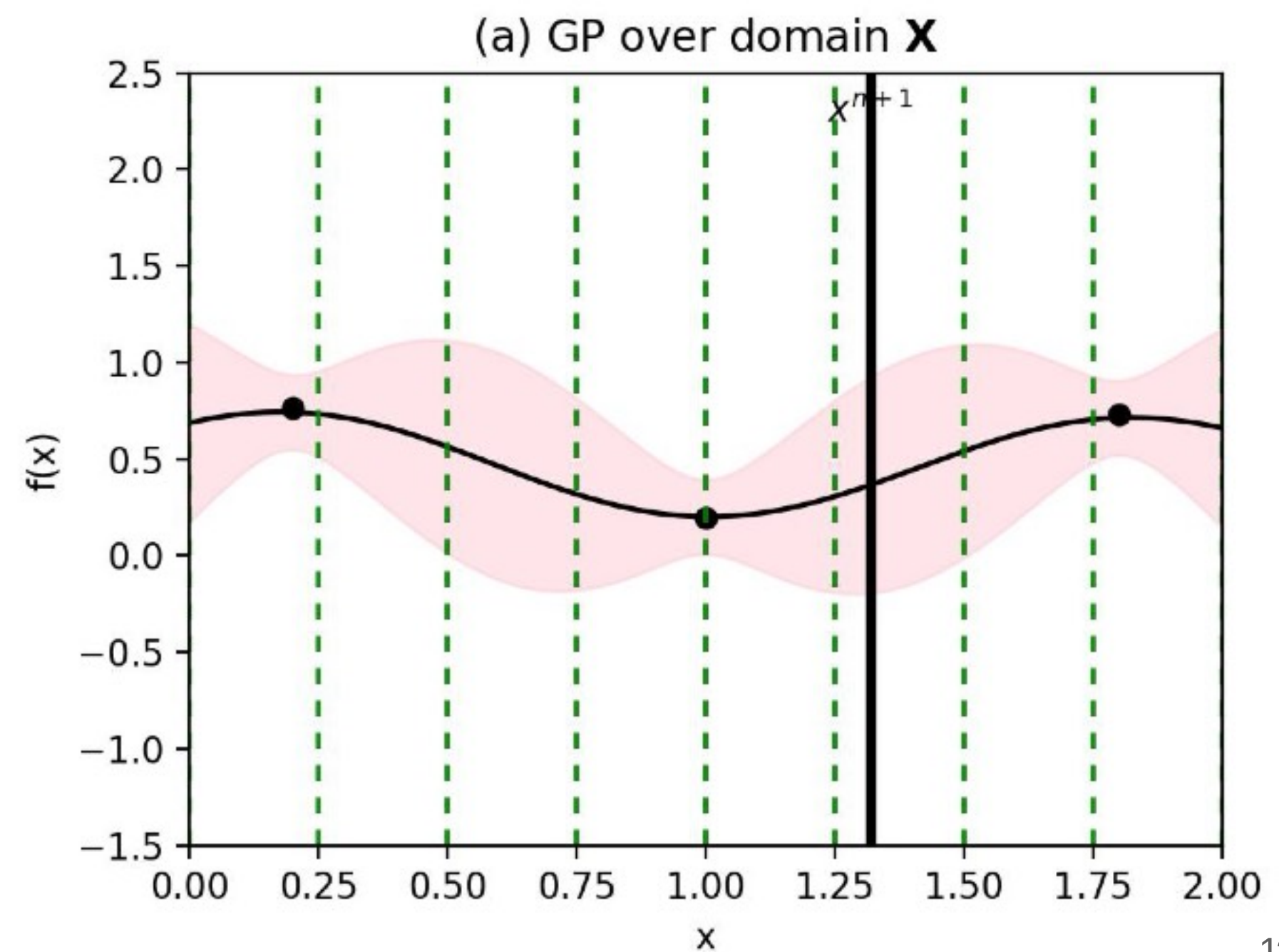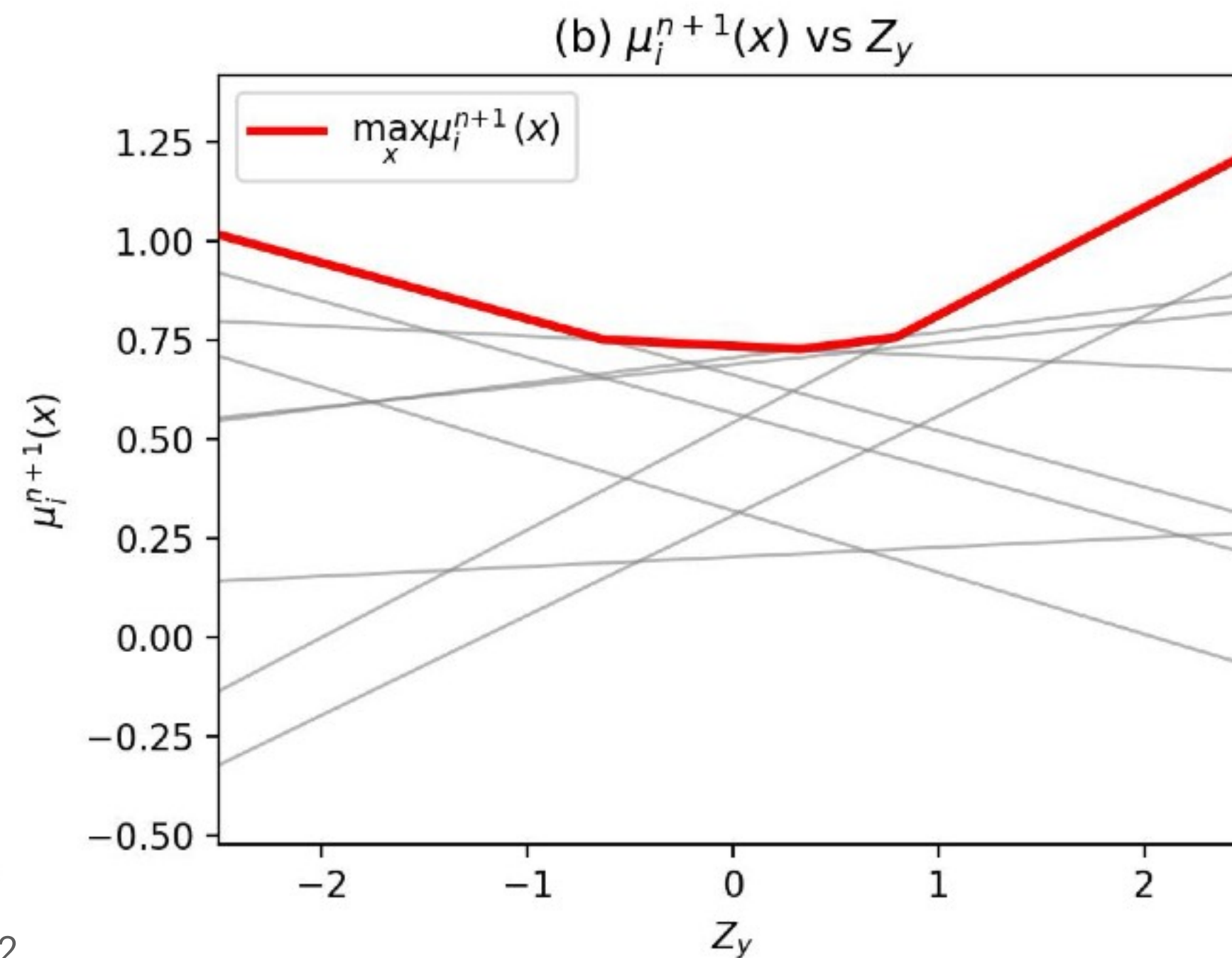# Discretization and Linear-Envelope -5

Scott et al 2011

Taking the maximum of these linear functions yields a piecewise-linear envelope representing $\max\limits_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\}$

Discretization and Linear-Envelope -6

Scott et al 2011

The linear envolope $\max_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\}$ is parametirized by Z_y which is the probability of that maximum happening.

We can integrate this linear envolope with respect to Z_y to obtain $\mathbb{E}_{Z_y} \left[\max_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\} \right]$.

Above quantity allows us to compute KG since the max of the old posterior can be taken out of the expectation.

$$KG(x) = \mathbb{E} \left[\max_{x'' \in \mathcal{X}} \{\mu_y^{n+1}(x'')\} \mid x^{n+1} = x \right] - \max_{x' \in \mathcal{X}} \{\mu_y^n(x')\} .$$

(b) $\mu_i^{n+1}(x)$ vs Z_y