Prelim Summer 2017, Q4 5894 3710 0798 4034

Part 1 $\pi(y=0) = 1/2 \qquad \pi(y=1) = 1/2$

$$\pi(x|y) = \begin{cases} N(\mu=1, \sigma=2), \text{ if } y=0 \\ N(\mu=2, \sigma=2), \text{ if } y=1 \end{cases}$$

$$\pi(x) = \sum_y \pi(x|y) \cdot \pi(y)$$

$$\pi(x) = \pi(x|y=0) \cdot \pi(y=0) + \pi(x|y=1) \cdot \pi(y=1)$$

$$\pi(x) = \frac{1}{2}\left[\pi(x|y=0)\right] + \frac{1}{2}\left[\pi(x|y=1)\right]$$

$$\pi(x) = \frac{1}{2} N(\mu=1, \sigma=2) + \frac{1}{2} N(\mu=2, \sigma=2)$$

use interval of 3σ for plotting

$1 - 3\sigma = -5$

$2 + 3\sigma = 8 \longrightarrow$ interval $[-5, 8]$

See attached Matlab code

See attached Plot of $\pi(x)$