Prelim Summer 2017, Q4 5894371007989034

Part 2

Find $\pi(y=1 \mid x=1)$, $\sigma = 2$

Bayes Theorem

$$\pi(y=1 \mid x=1) = \frac{\pi(y=1)\,\pi(x=1 \mid y=1)}{\pi(x=1)}$$

$\pi(y=1) = \frac{1}{2}$

$\pi(x=1 \mid y=1)$ = value of $N(\mu=2, \sigma=2)$ at $x=1$

$\pi(x=1 \mid y=1) = 0.1760$ ← (From matlab code attached)

$\pi(x=1) = \frac{1}{2}$ [value of $N(1,2)$ at $x=1$] $+ \frac{1}{2}$ [value of $N(2,2)$ at $x=1$]

$\pi(x=1) = \frac{1}{2}[0.1995] + \frac{1}{2}[0.1760] = 0.18775$

↑ From attached matlab code

$$\pi(y=1 \mid x=1) = \frac{(\frac{1}{2})(0.1760)}{(0.18775)}$$

$\pi(y=1 \mid x=1) = 0.4687$