Tutorial 3

1. Consider a logistic regression model

$$\log\frac{p(y=1|x)}{p(y=0|x)} = 1.0 + 2.0x$$

The probability that $y = 1$ when $x = 5$ is ()

a. 0.88 b. 0.21 c. 1.0 d. 0.37

2. If the probability density function $p(\boldsymbol{x}|c) \sim \mathcal{N}(\boldsymbol{\mu}_c, \boldsymbol{\sigma}_c^2)$, proof:

the MLE of $\boldsymbol{\mu}_c$ and $\boldsymbol{\sigma}_c^2$ is

$$\widehat{\boldsymbol{\mu}}_c = \frac{1}{|D_c|}\sum_{\boldsymbol{x}\in D_c} \boldsymbol{x}$$

$$\widehat{\boldsymbol{\sigma}}_c^2 = \frac{1}{|D_c|}\sum_{\boldsymbol{x}\in D_c} (\boldsymbol{x}-\widehat{\boldsymbol{\mu}}_c)(\boldsymbol{x}-\widehat{\boldsymbol{\mu}}_c)^T$$

(Normal distribution: $f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{x-\mu^2}{2\sigma^2}}$)