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# 4.1

#4.2

Let , \ Since exponential function is monotonely increasing\

$$
\exp(\delta\_{k}(x))>\exp(\delta\_{i}(x))\\
\Rightarrow\pi\_{k}\exp(\frac{\mu\_{k}}{\sigma^2}-\frac{\mu\_{k}^2}{2\sigma^2})>\pi\_{i}\exp(\frac{\mu\_{i}}{\sigma^2}-\frac{\mu\_{i}^2}{2\sigma^2})
$$

thus we prove that maximizing  is equivalent to maximizing  \

# 4.3

Since we assume that the  of each class is not same, so we can’t remove the .

It is not linear, and we can see that it is quadratic.