Classification

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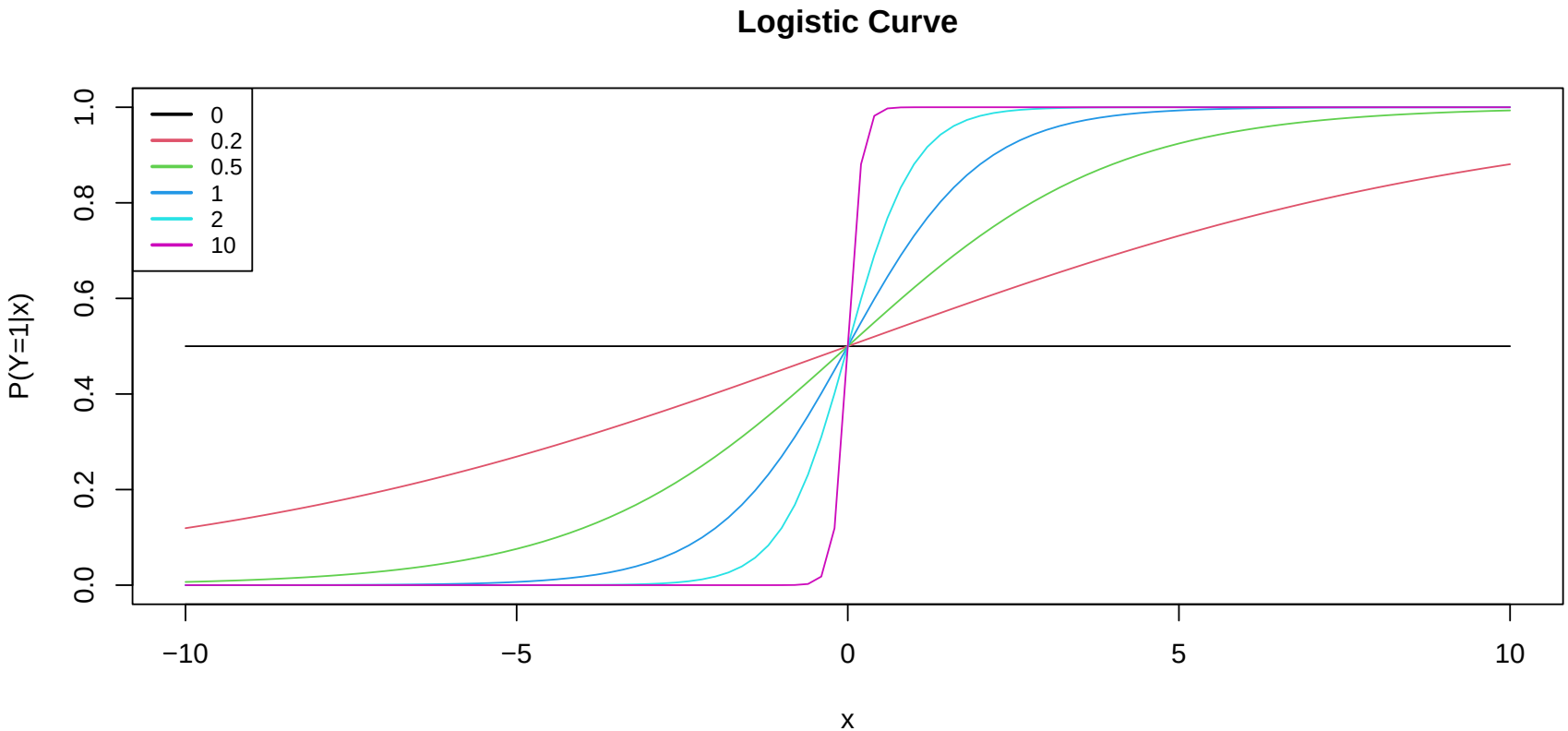
Outline

- The probabilities of $y = 1$ and $y = -1$ are expressed by $\frac{e^{\beta_0 + x\beta}}{1+e^{\beta_0 + x\beta}}$ and $\frac{1}{1+e^{\beta_0 + x\beta}}$

$$\frac{1}{1 + e^{-y(\beta_0 + x\beta)}}$$



increasing monotonically and convex and concave

$$f'(x) = \beta \frac{e^{-(\beta_0 + x\beta)}}{(1 + e^{-(\beta_0 + x\beta)})^2} \geq 0$$

$$f''(x) = -\beta^2 \frac{e^{-(\beta_0 + x\beta)}[1 - e^{-(\beta_0 + x\beta)}]}{(1 + e^{-(\beta_0 + x\beta)})^3}$$

- We see that $f(x)$ is increasing monotonically and is convex and concave when $x < -\beta_0/\beta$ and $x > -\beta_0/\beta$, they chage at $x = 0$, when $\beta = 0$

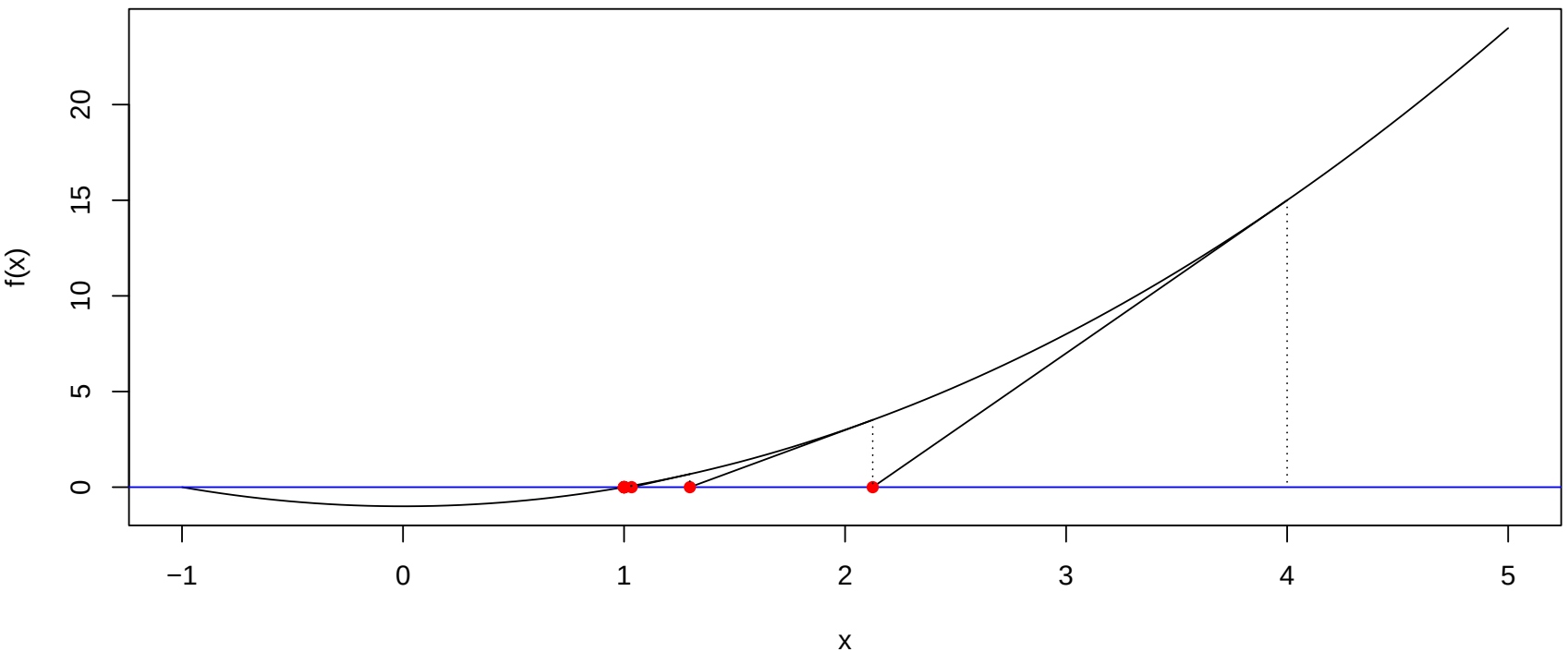
Outline

Netwon Raphson

- Tangent line is $y - f(x_i) = f'(x_i)(x - x_i)$ the intersection with y $= 0$

$$x_{i+1} \triangleq x_i - \frac{f(x_i)}{f'(x_i)}$$

- Example $f(x) = x^2 - 1$ and $x_0 = 4$



Newton Raphson Method for two variables