

# Curve sketching (1)

## Intersections with X-/Y-axis

### Y-Intercept

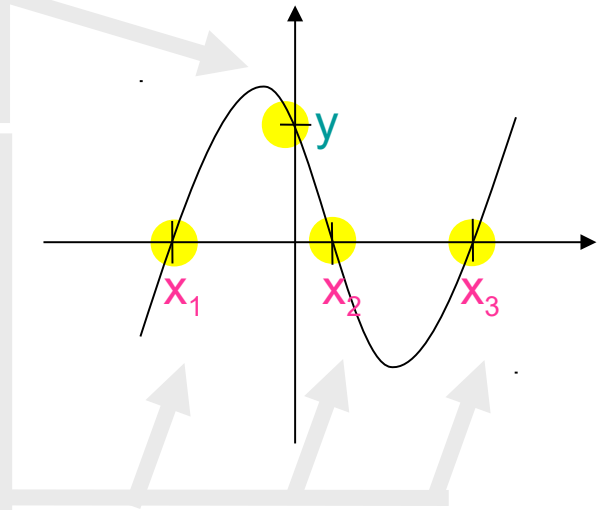
Calculate  $f(0)$   
 $P(0|Y)$

### Roots

1.  $f(x)=0$
2. Solve for  $X$   
(see [Nullstellenberechnung.pdf](#))

Y-values of roots are always zero,  
thus no need to calculate them

$N_1(X_1|0)$   $N_2(X_2|0)$   $N_3(X_3|0)$



## Extrema

1. Calculate stationary points
  1. Set  $f'(x)=0$  !\*
  2. Solve for  $x$  (see [Nullstellenberechnung.pdf](#))
  3. Insert  $x$ -value(s) in  $f(x)$  in order to get the  $y$ -value(s)
2. Is it a maximum(max), minimum(min) or saddle point(SP)?

1. Insert the  $x$ -values in  $f''(x)$

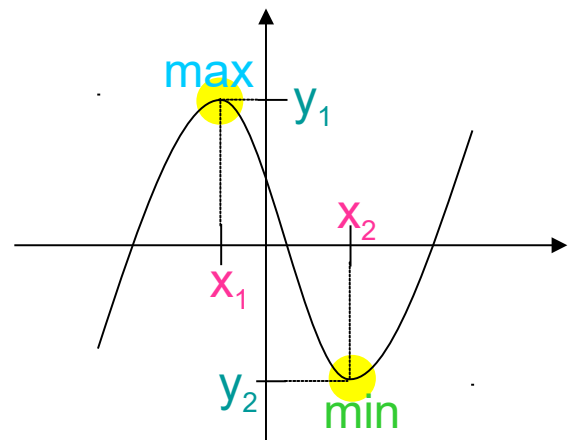
If  $f''(x)=0$  then SP

If  $f''(x)>0$  then min

If  $f''(x)<0$  then max

$\max(X_1|Y_1)$

$\min(X_2|Y_2)$

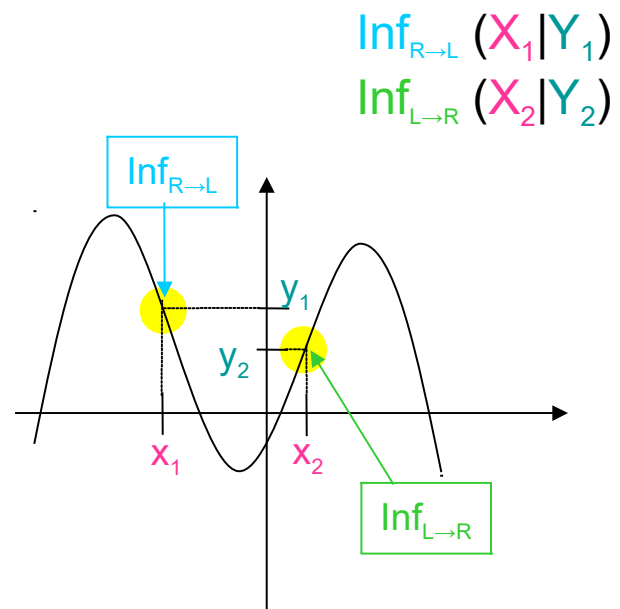


\* Here we calculate the roots of the derivative

# Curve sketching (2)

## Points of inflection (Inf)

1. Calculate the stationary points of the derivative
  1. Set  $f''(x)=0$
  2. Solve for  $x$  (see [Nullstellenberechnung.pdf](#))
  3. Insert  $x$ -value(s) in  $f(x)$  in order to get the  $y$ -value(s)
2. Check if  $\text{Inf}_{R \rightarrow L}$  or  $\text{Inf}_{L \rightarrow R}$  or no Inf at all:
  1. Insert the  $x$ -values in  $f'''(x)$   
If  $f'''(x)=0$  then NO Inf  
If  $f'''(x)>0$  then  $\text{Inf}_{R \rightarrow L}$   
If  $f'''(x)<0$  then  $\text{Inf}_{L \rightarrow R}$



**Symmetry:** [Symmetrie.pdf](#)

**Limits:** [Grenzbetrachtungen\\_limes.pdf](#)