

Funktionen in 'R²

10. Schulstufe

Schwarzdruckkopiervorschläge mit großer
Schrift und starken Linien

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Funktionen 10. Schulstufe

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Abkürzungen

f_P: Potenzfunktion

f_Ex: Exponentialfkt.

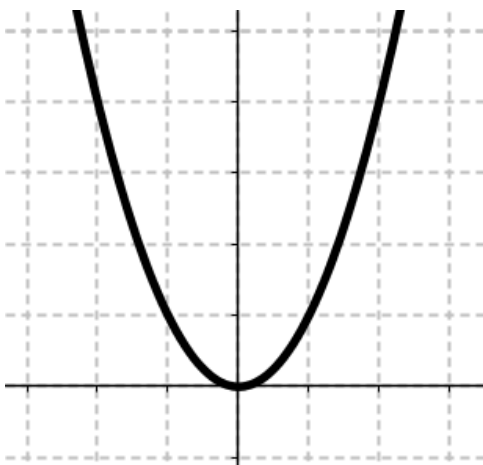
f_Log: Logarithmfkt.

f_W: Winkelfunktion

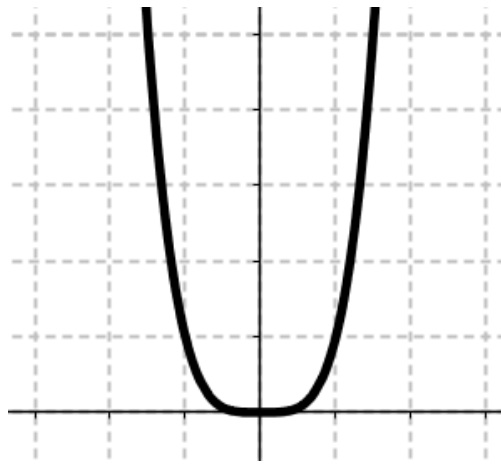
$f_{P.1}: f(x) = x^n$

$n \in \mathbb{N}$, n gerade,

$n=2$

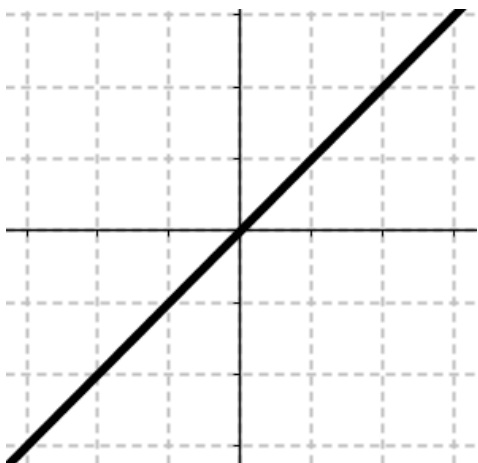


$n=4$



$n \in \mathbb{N}$, n ungerade,

$n=1$



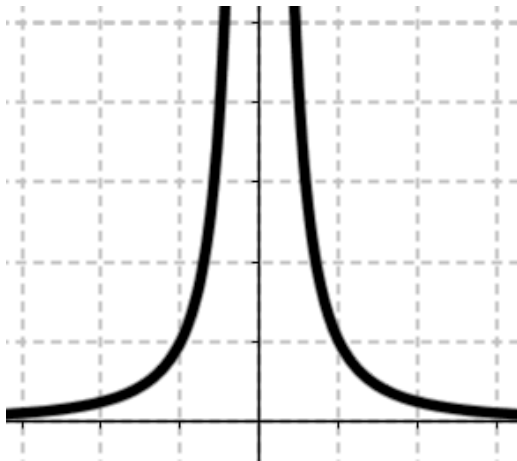
$n=3$



$f_{P.2}: f(x) = x^{-n}$

$n \in \mathbb{N}$, n gerade,

$n = -2$

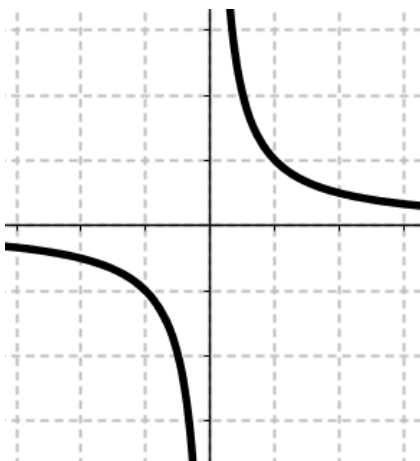


$n = -4$

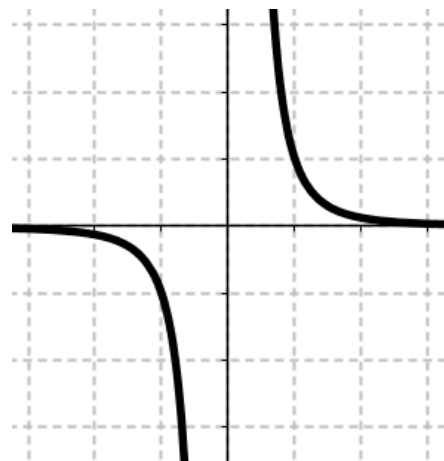


$n \in \mathbb{N}$, n ungerade,

$n = -1$



$n = -3$

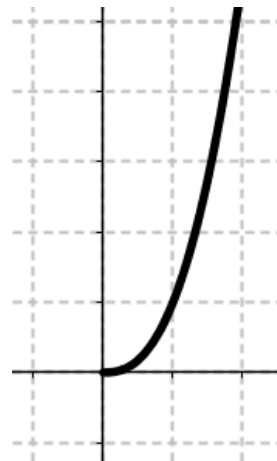
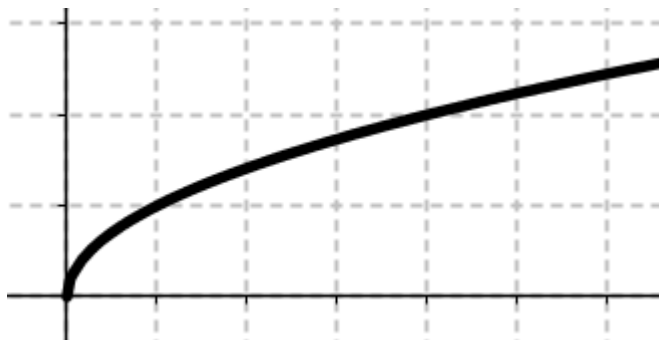


$f_{P.3}: f(x) = x^{(m/n)}$

$m/n \in \mathbb{Q} \setminus \mathbb{Z}, m/n > 0$

$m/n = 1/2$

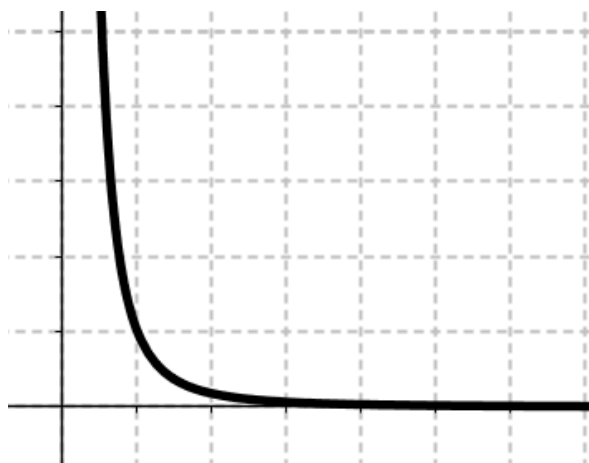
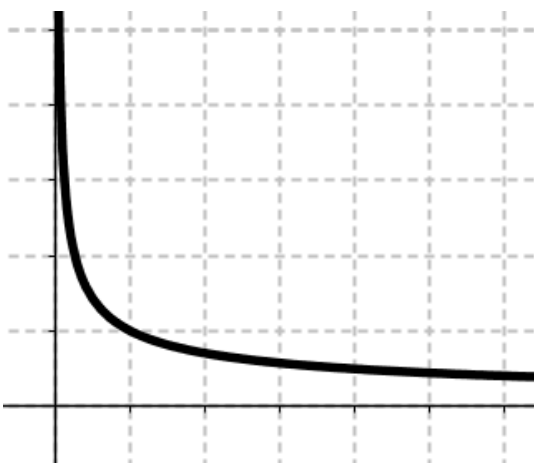
$m/n = 5/2$



$m/n \in \mathbb{Q} \setminus \mathbb{Z}, m/n < 0$

$m/n = -1/2$

$m/n = -5/2$



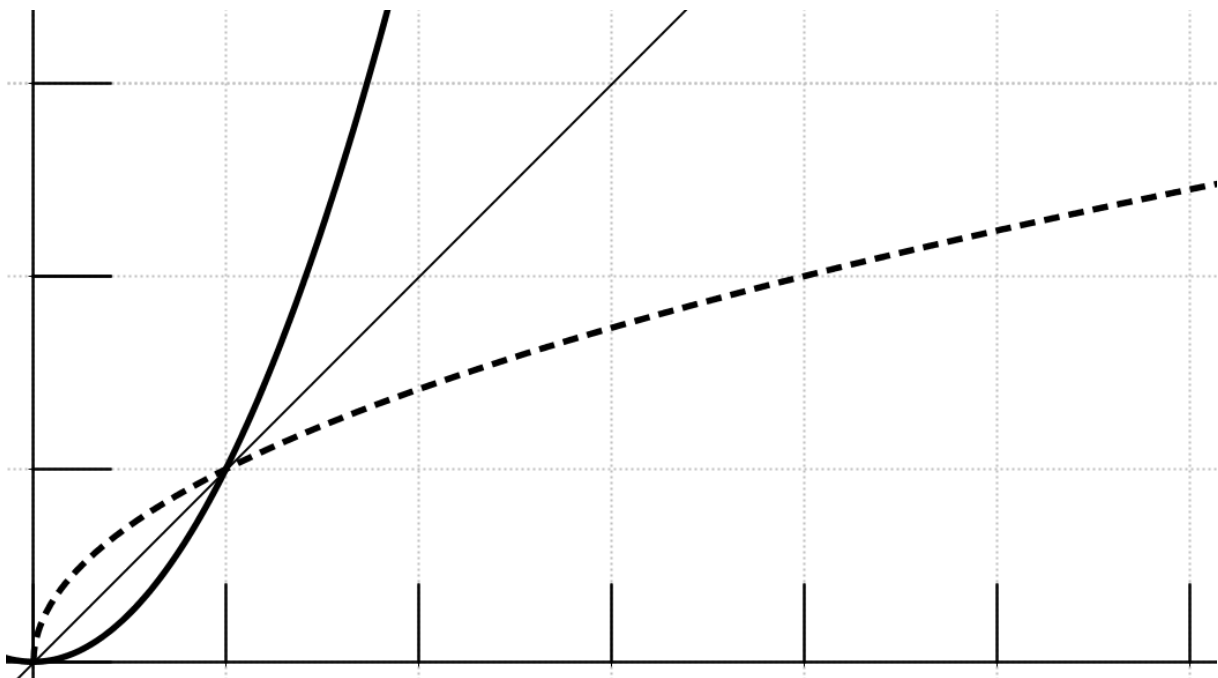
f_P.4: Umkehrfunktion

$$x \geq 0$$

Spiegelung an 1. Mediane

$$f(x) = x^2 \quad \text{—————}$$

$$g(x) = \sqrt{x} \quad \text{- - - -}$$

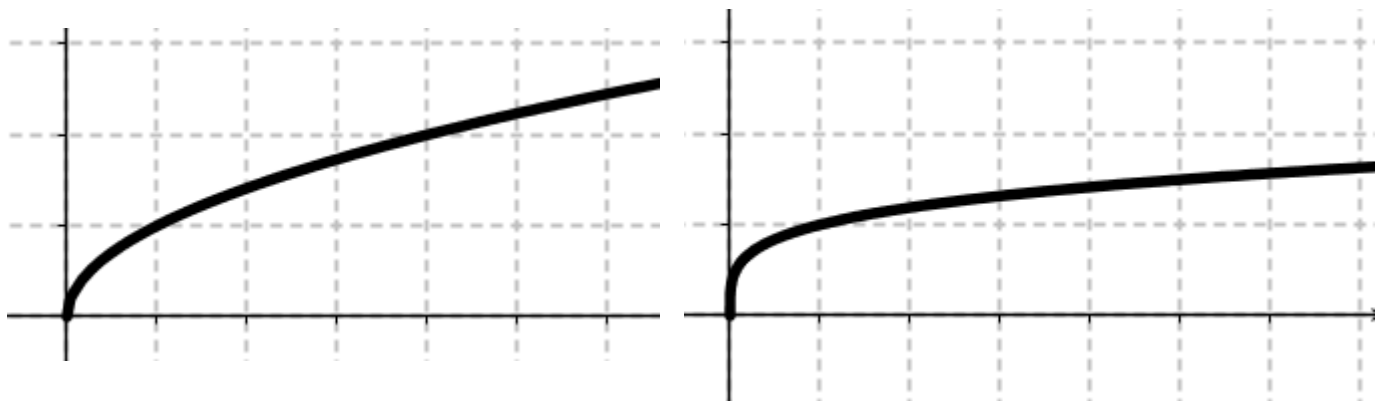


f_P.5: $f(x) = 'w[n](x)$

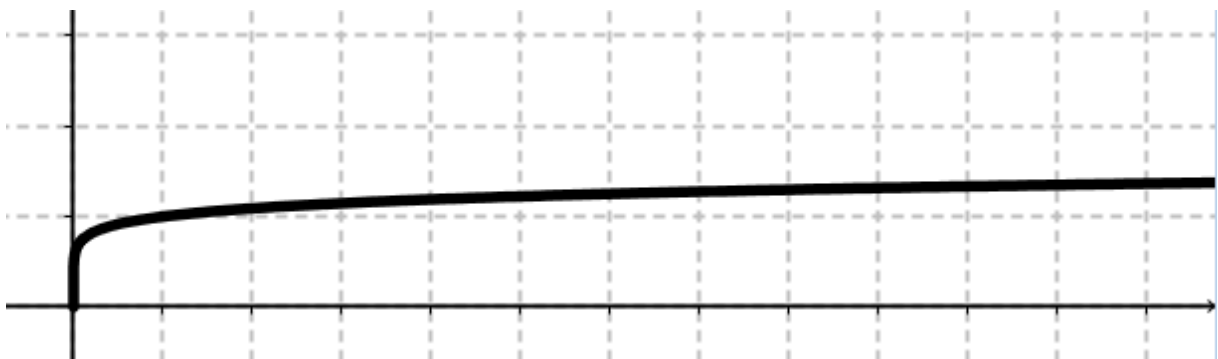
Wurzelfunktion

$'w(x)$

$'w[4](x)$



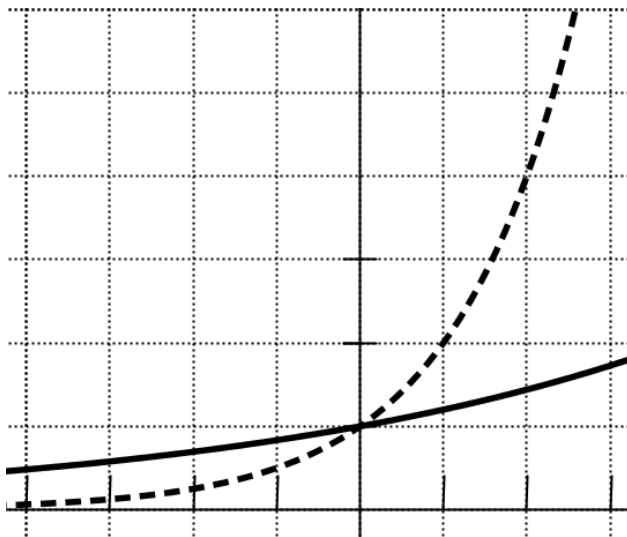
$'w[8](x)$



f_Ex.1: $f(x) = a^x$

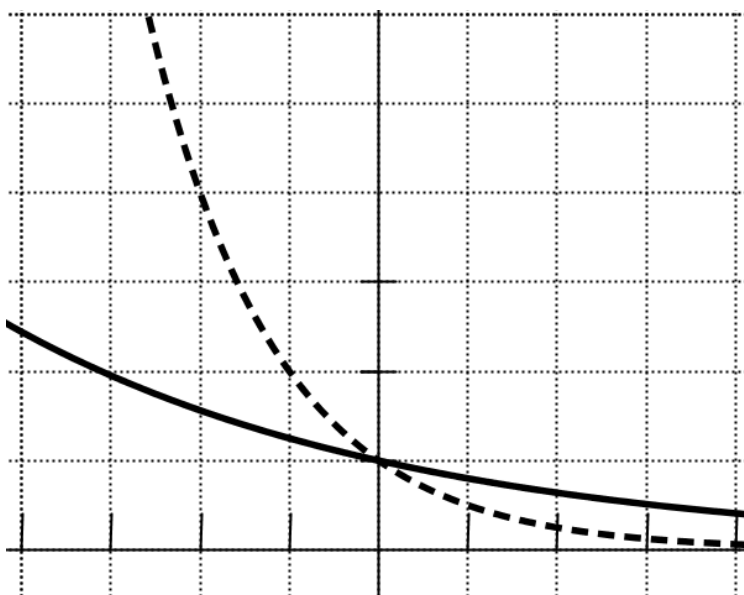
$a > 1$; steigend

$a = 1,2$ ——— $a = 2$ - - - -



$0 < a < 1$; fallend

$a = 0,8$ ——— $a = 1/2$ - - - -

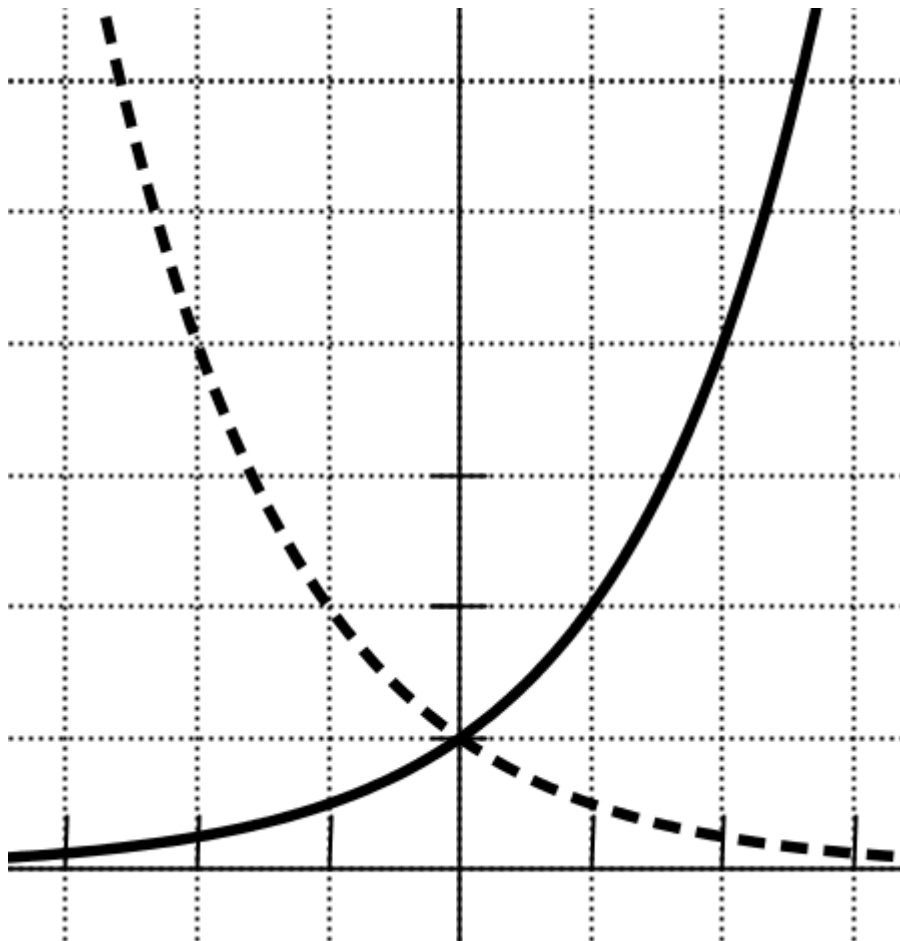


f_Ex.2: $f(x) = a^x$

spiegeln an y-Achse

$a_1 = 2$ ———

$a_2 = 1/a_1 = 1/2$ - - - -

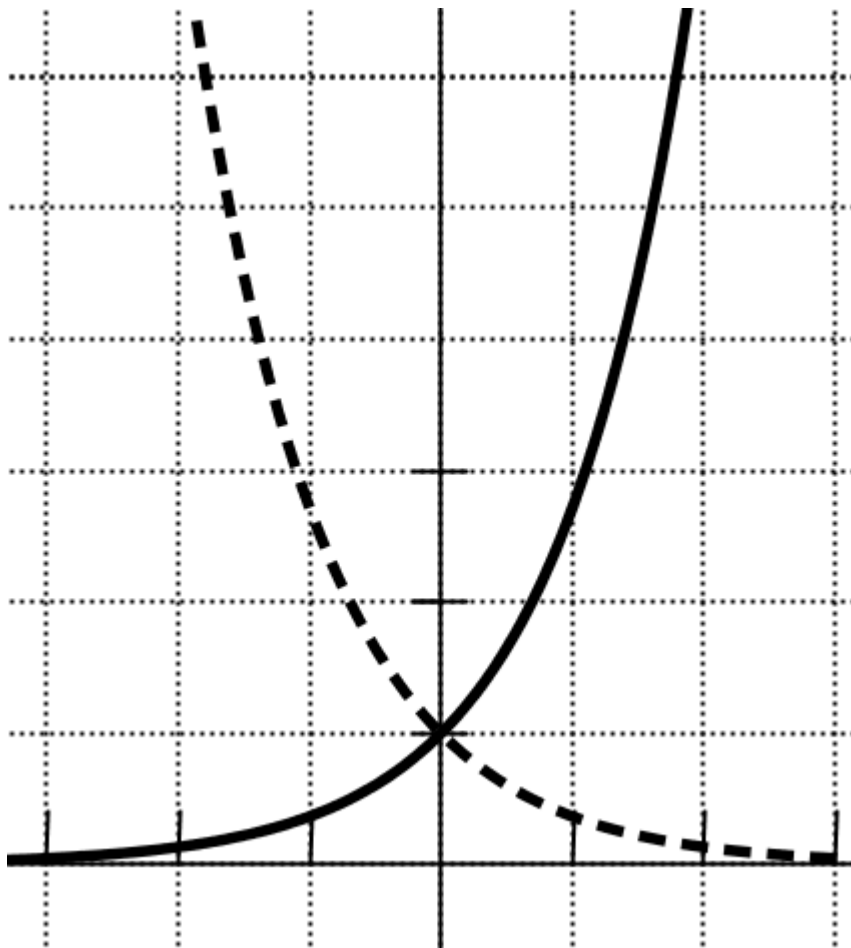


f_Ex.3: $f(x) = e^x$

spiegeln an y-Achse

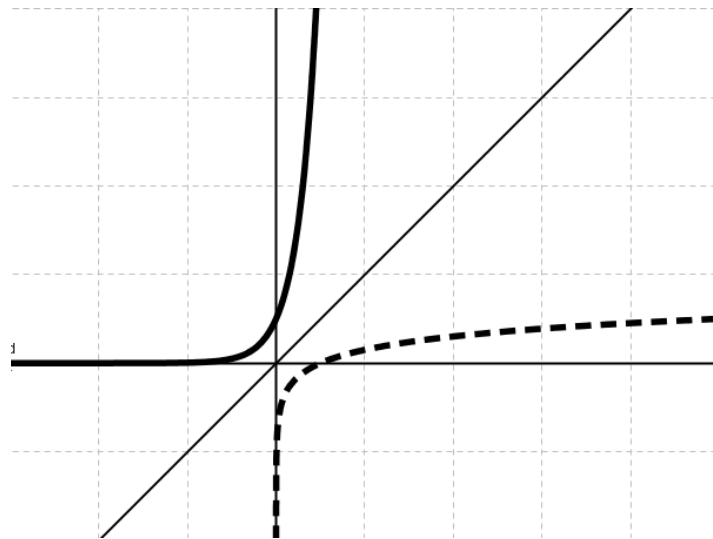
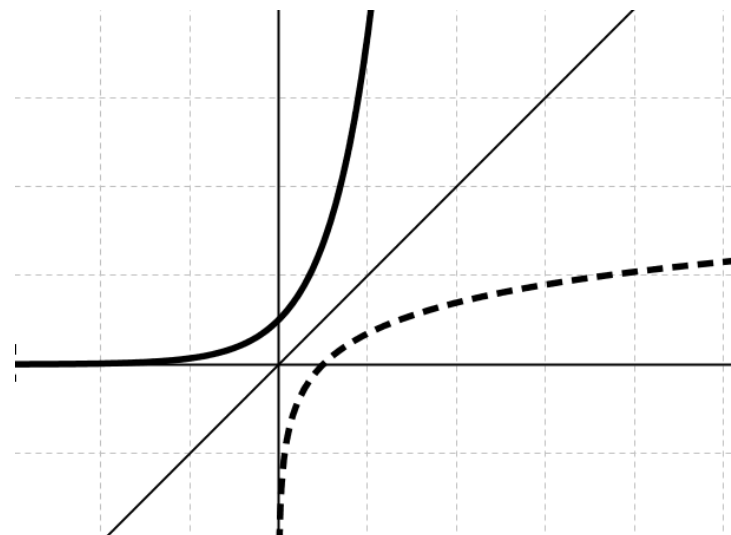
$e \sim 2,7$ ———

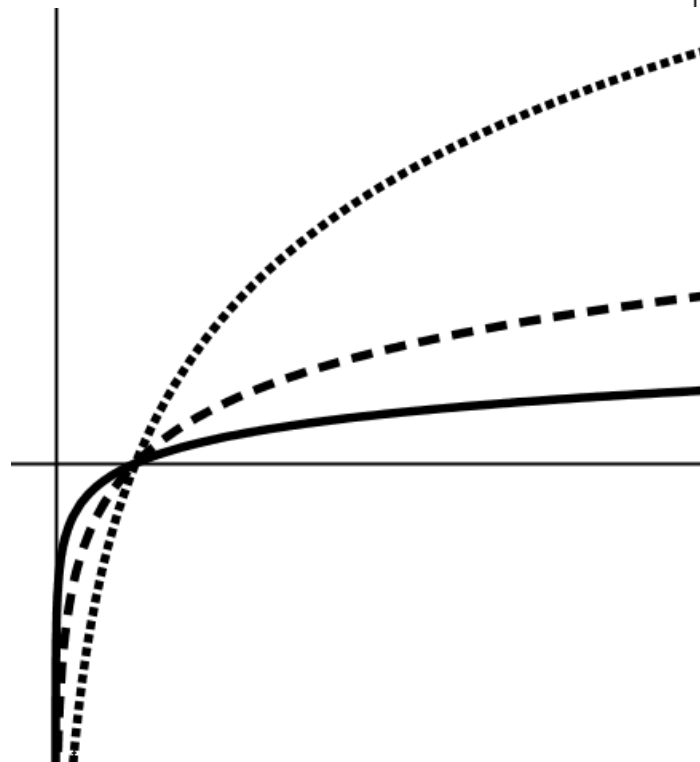
$1/e \sim 0,37$ - - - -

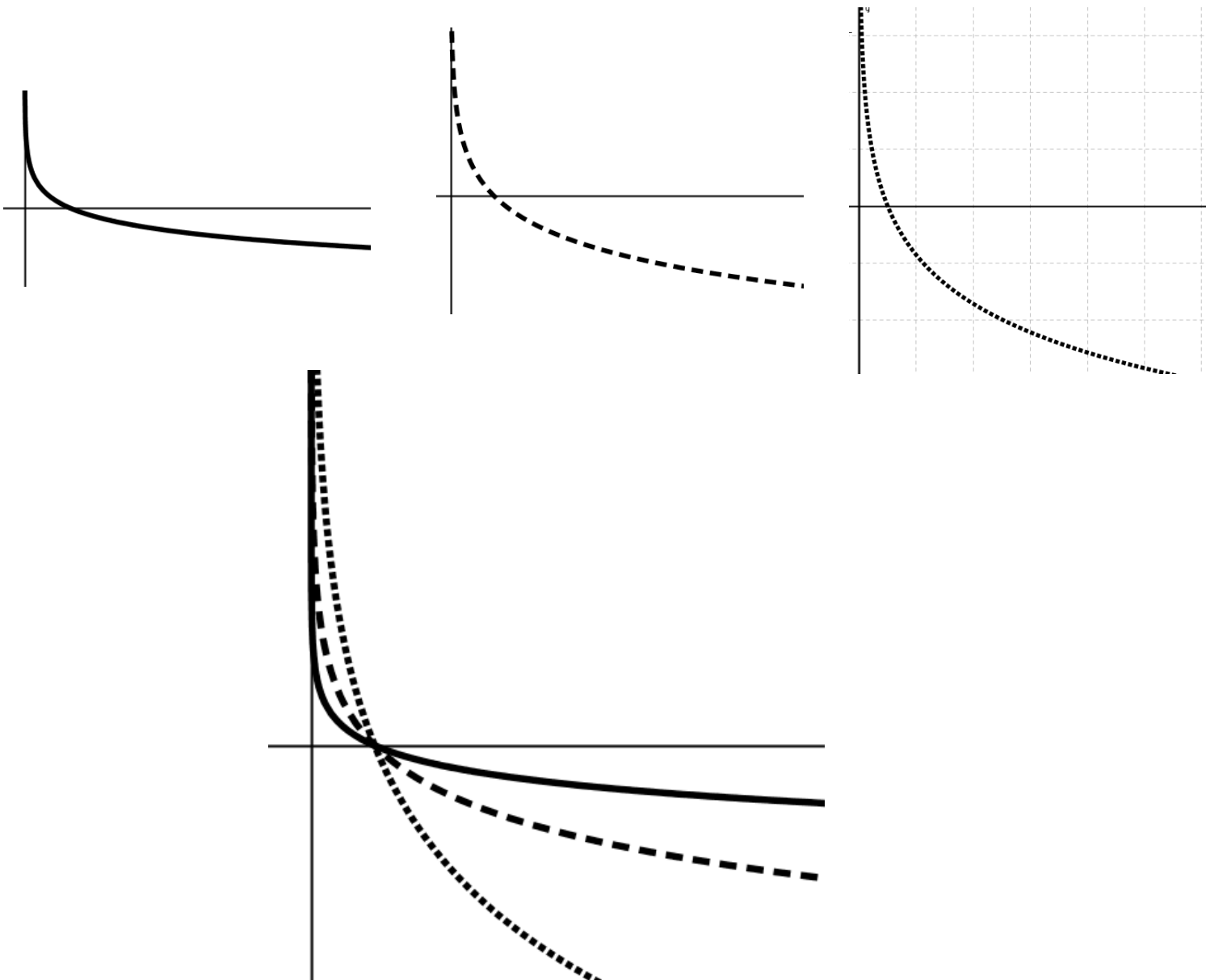


f_Ex.4: Umkehrfkt.

Spiegeln an 1. Mediane

 10^x ——— $\lg(x)$ - - -

 e^x ——— $\ln(x)$ - - -


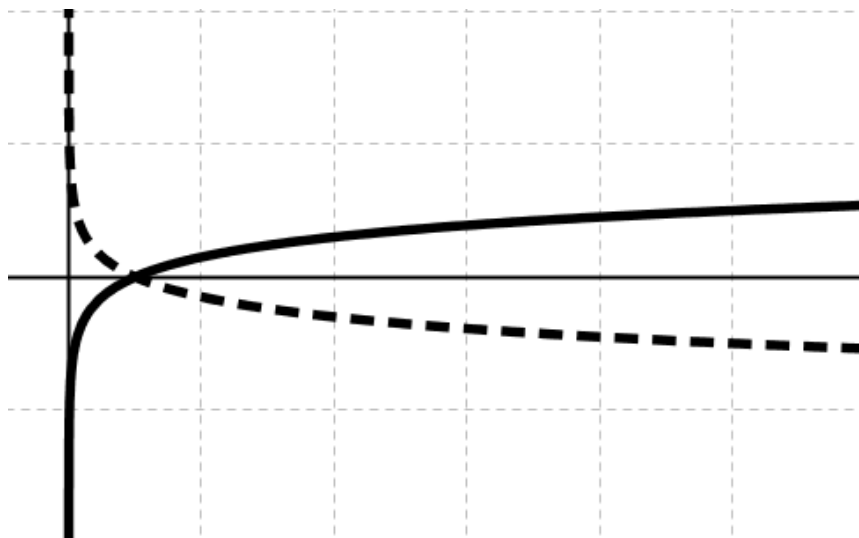
f_Log.1: $f(x) = \log_a(x)$ $a > 1$; steigend, $P(1|0)$ $a = 10$ ————— $a = e$ - - - - $a = 1,5$


f_Log.2: $f(x) = \log_a(x)$ $0 < a < 1$; fallend, $P(1|0)$ $a = 1/10$ ————— $a = 1/e$ - - - - $a = 1/1,5$
.....

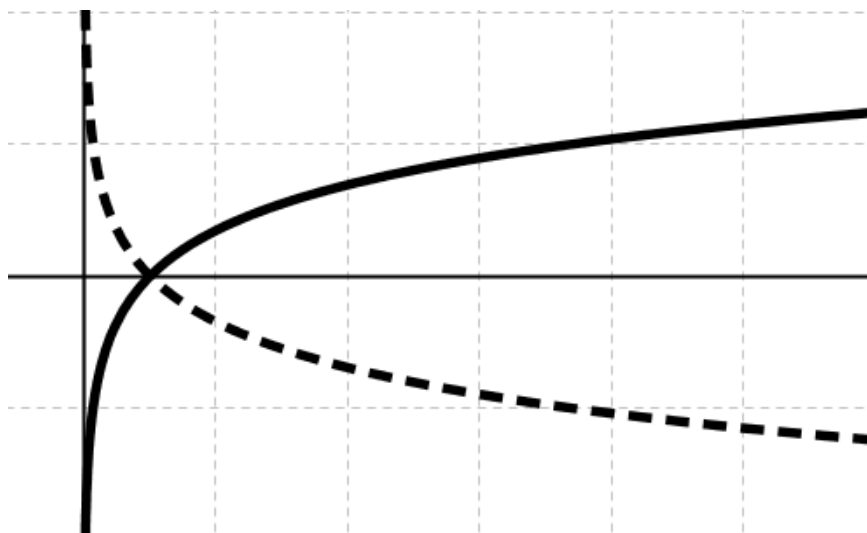
f_Log.3: $f(x) = \log_a(x)$

Spiegeln an x-Achse

$a = 10$ ——— $a = 1/10$ - - - -



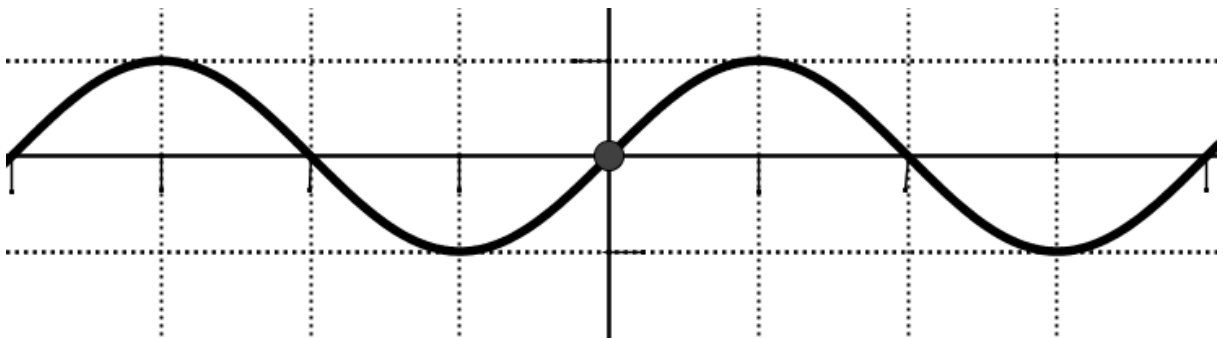
$a = e$ ——— $a = 1/e$ - - - -



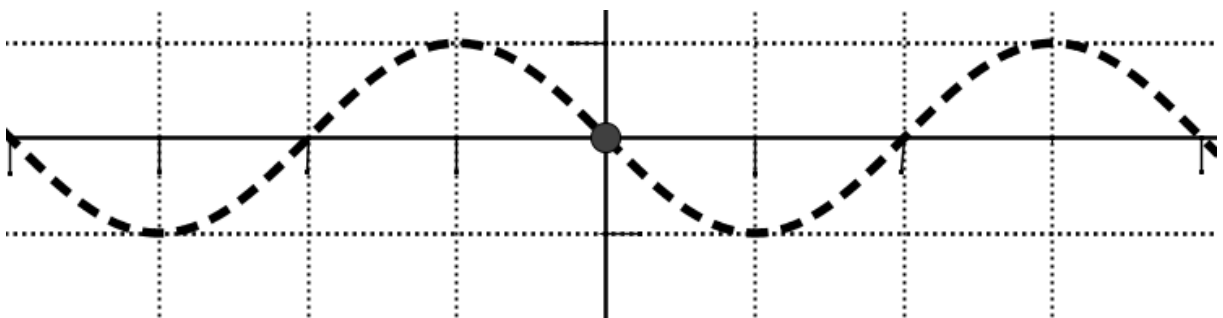
f_W.1: $f(x) = \sin(x)$

Skalierung: x: 'pi/2; y: 1

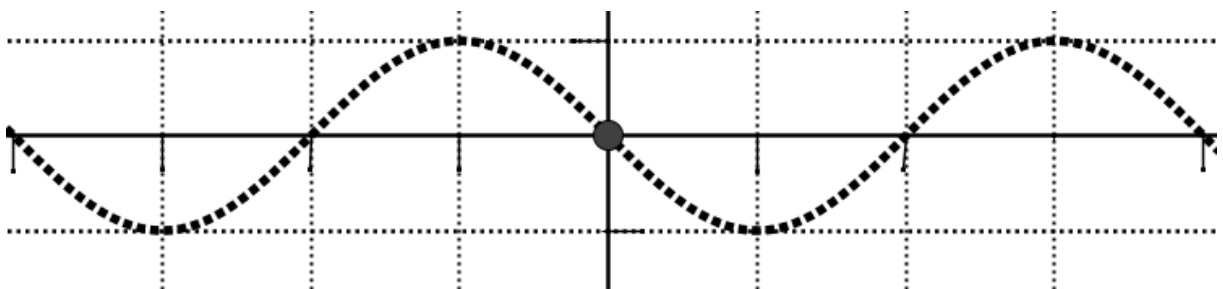
'sin(x): [0; 'pi/2] steigend



'sin(-x): [0; 'pi/2] fallend



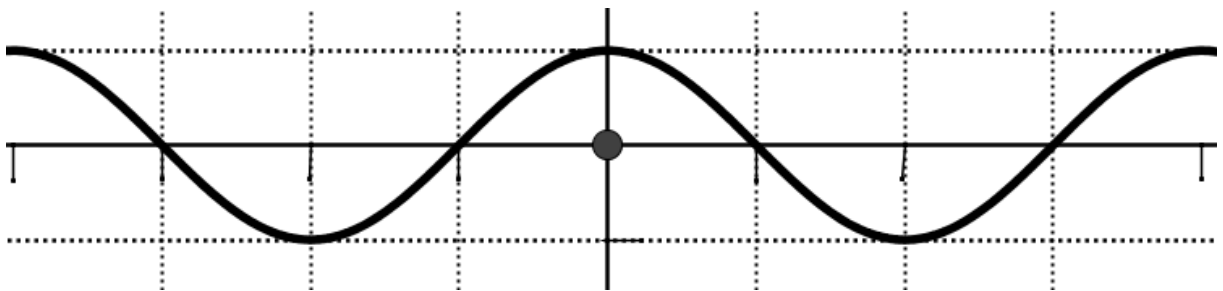
-'sin(x): [0; 'pi/2] fallend



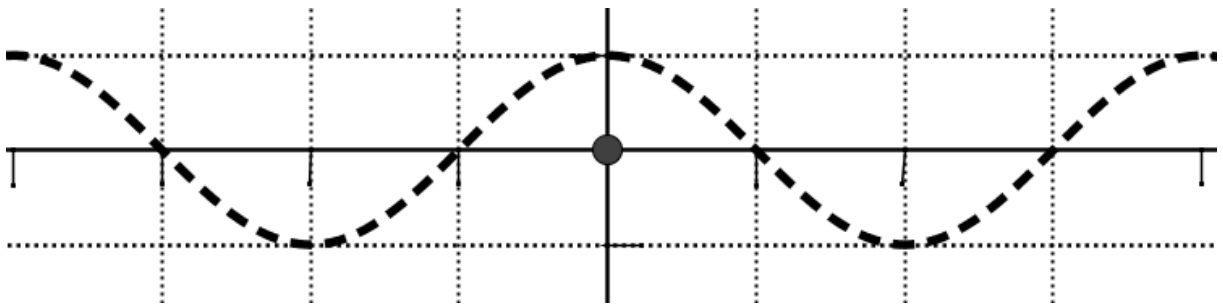
f_W.2: $f(x) = \cos(x)$

Skalierung: x: $\pi/2$; y: 1

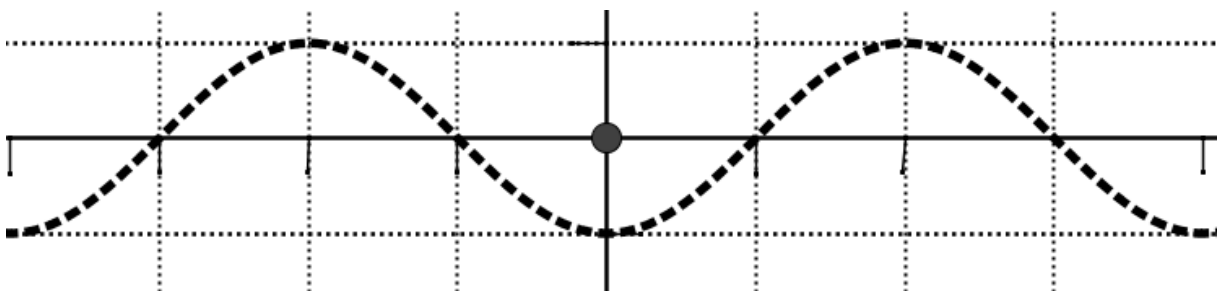
$\cos(x)$: $[0; \pi/2]$ fallend



$\cos(-x)$: $[0; \pi/2]$ fallend



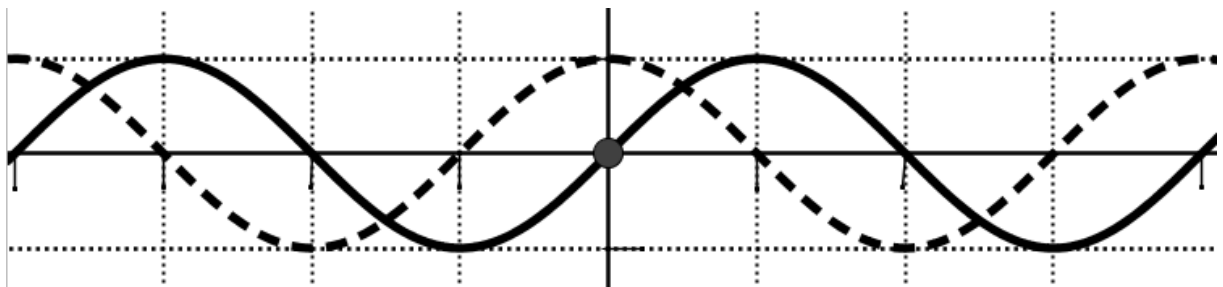
$-\cos(x)$: $[0; \pi/2]$ steigend



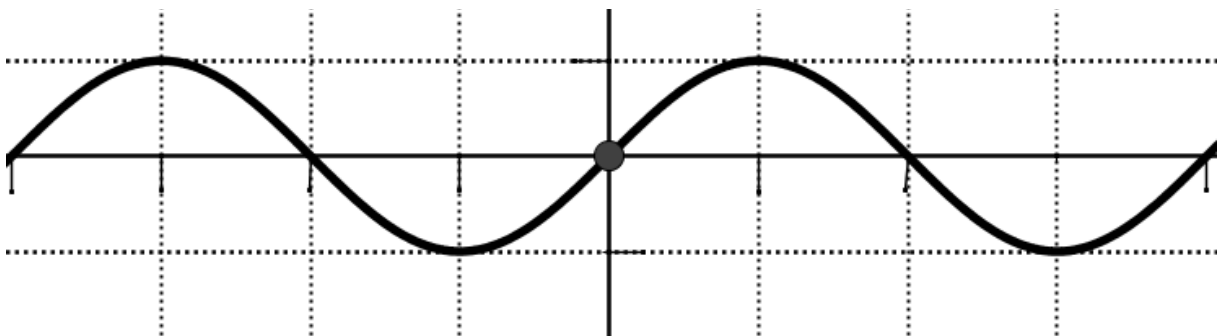
f_W.3: 'sin / 'cos

Skalierung: x: 'pi/2; y: 1

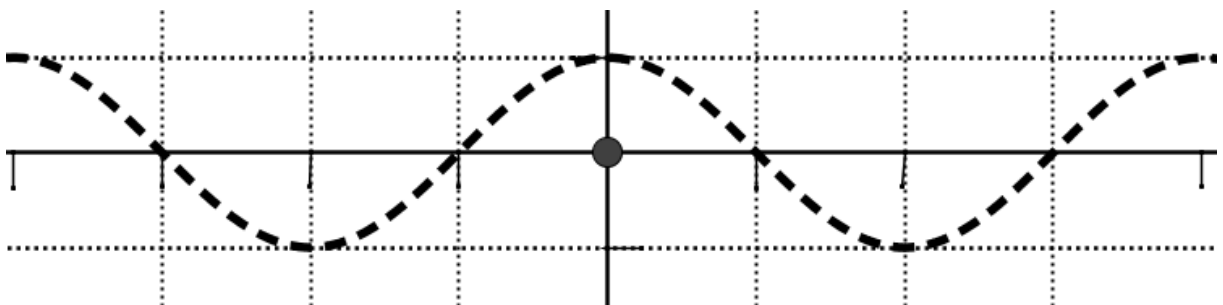
'sin(x) ——— 'cos(x) - - - -



$$'sin(x) = 'cos(x - 'pi/2)$$



$$'cos(x) = 'sin(x + 'pi/2)$$



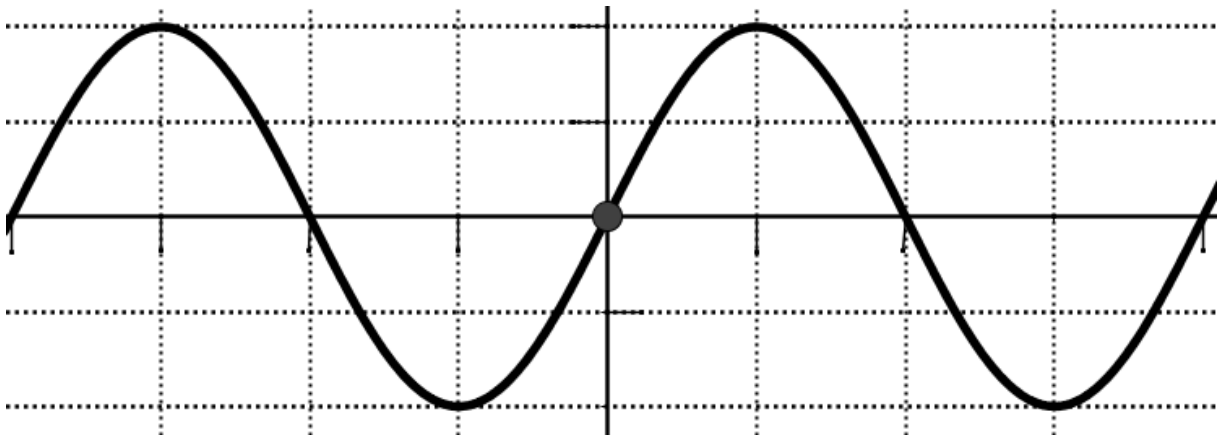
f_W.4: $f(x) = a \cdot \sin(x)$

Skalierung: x: 'pi/2; y: 1

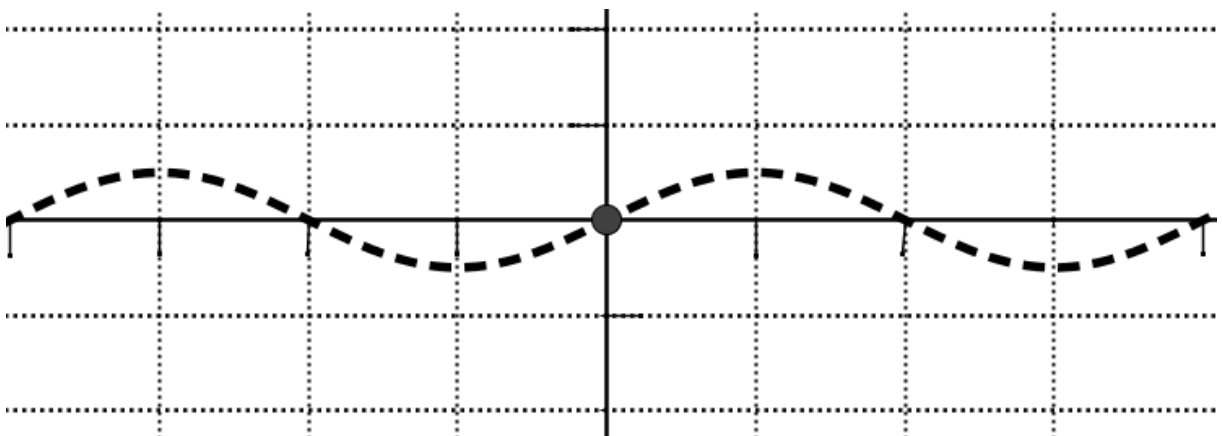
N(0|0), N('pi|0)

H('pi/2|a), T(3 * 'pi/2|-a)

$a = 2$



$a = 1/2$



f_W.5: $f(x) = \sin(b \cdot x)$

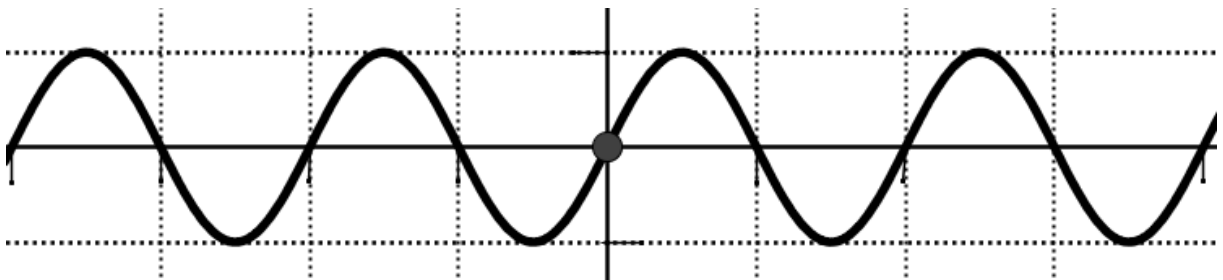
Skalierung: x: 'pi/2; y: 1

$N(0|0)$, $N(\pi/b|0)$

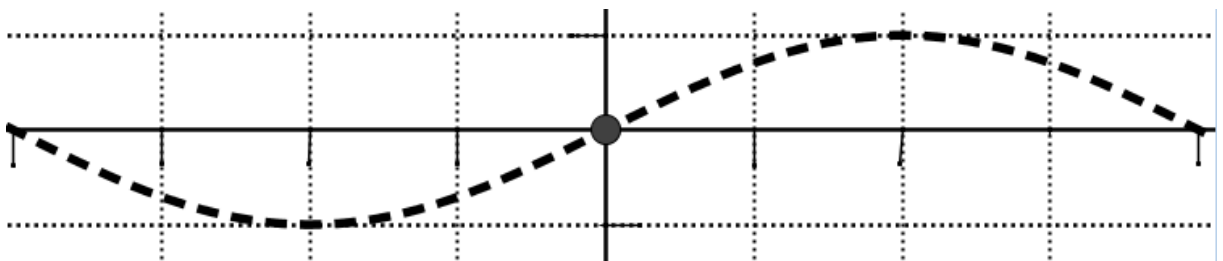
$H(\pi/(2 \cdot b)|1)$,

$T(3 \cdot \pi/(2 \cdot b)|-1)$

$b = 2$



$b = 1/2$



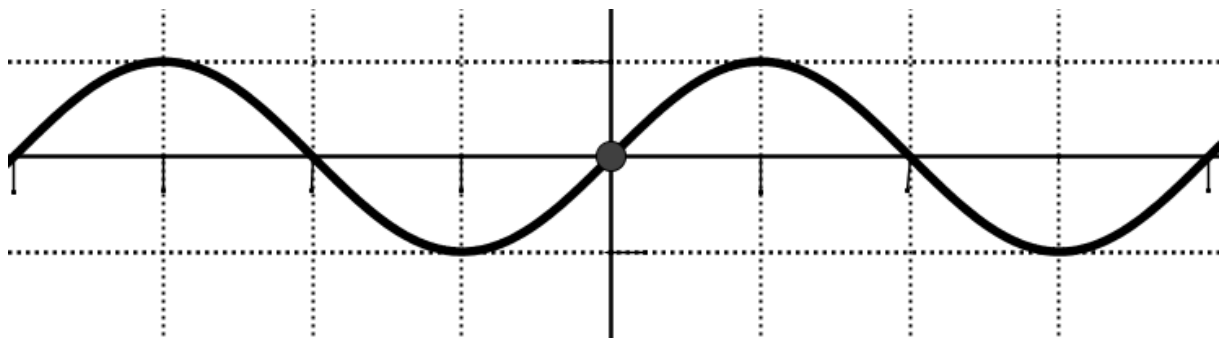
f_W.6: $f(x) = \sin(x) + c$

senkrechte Verschiebung

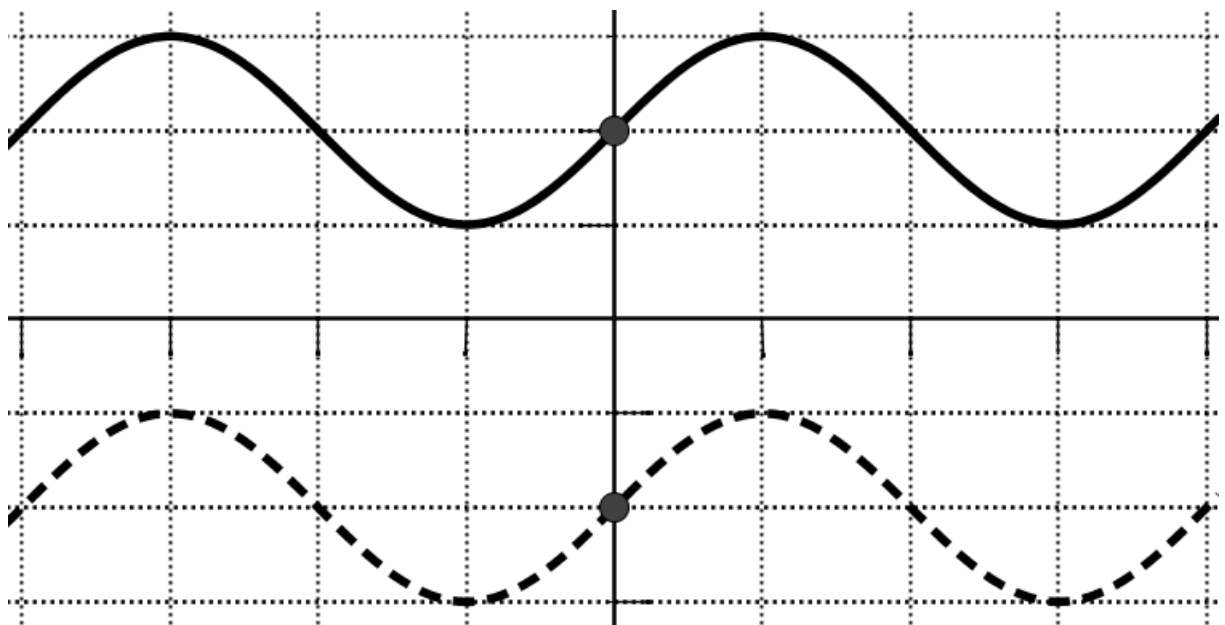
enthält $P(0|c)$

Skalierung: x: $\pi/2$; y: 1

$$c = 0$$



$$c = 2 \quad \text{—————} \quad c = -2 \quad \text{-----}$$

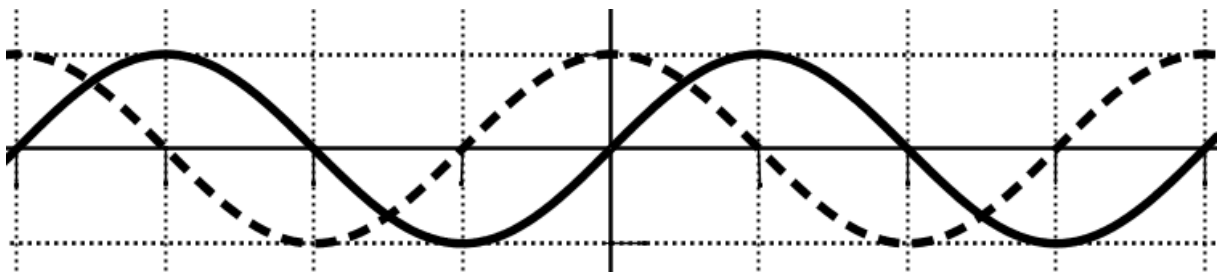


f_W.7: $f(x) = \sin(x+d)$

waagrechte Verschiebung
 $N(-d|0)$

Skalierung: x: $\pi/2$; y: 1

$d = \pi/2$; $\pi/2$ nach links



$d = -\pi/2$; $\pi/2$ nach rechts

