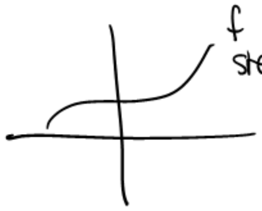
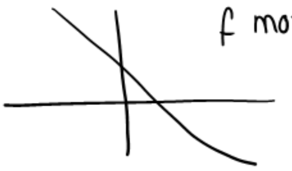
**Aufgabe:** $\frac{1}{2}x^2 - 3x + 4 = 0 \iff x^2 - 6x + 8 = 0$

$\iff \underline{x^2 - 6x + 3^2} - 3^2 + 8 = 0$

$\iff (x-3)^2 = 1 \iff x = 3 - \sqrt{1} = 2 \vee x = 3 + \sqrt{1} = 4$



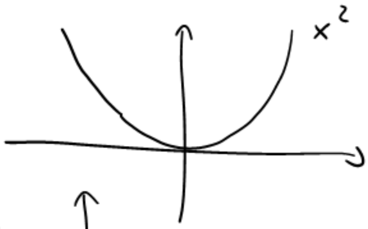
f mon. steigend



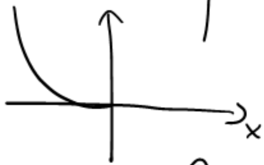
f mon. fallend

**Bsp:**

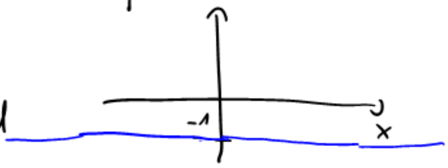
- $f: \mathbb{R} \to \mathbb{R},\ x \mapsto x^2$ ist weder mon. wachsend noch mon. fallend.




- $f: (-\infty, 0],\ x \mapsto x^2$ ist streng mon. fallend




- $f: \mathbb{R} \to \mathbb{R},\ f(x) = -1$ ist sowohl mon. wachsend als auch mon. fallend, aber nicht streng monoton.




**Bsp: zu 5.8**

$p(x) = -3x^4 - 6x + 36$. Dann ist $n = \text{grad}(p) = 4$,

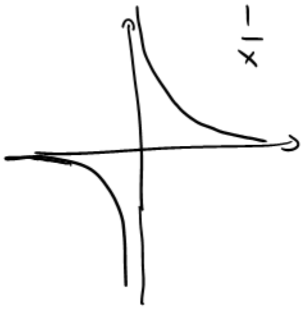
$a_4 = -3,\ a_3 = a_2 = 0,\ a_1 = -6,\ a_0 = 36$

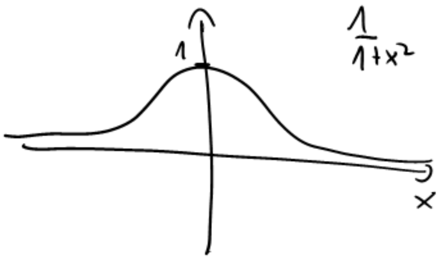
Hier: $x_0 = -2$ ist eine Nullstelle von $p$.

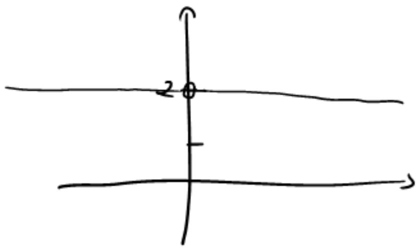
**zu 5.10** $(-3x^4 - 6x + 36) : (x+2) = \underbrace{-3x^3 + 6x^2 - 12x + 18}_{q(x)}$

$$
\begin{array}{l}
\ominus\ \underline{(-3x^4 - 6x^3)} \\
\quad 0 + 6x^3 \\
\ominus\ \quad \underline{6x^3 + 12x^2} \\
\qquad 0 - 12x^2 - 6x \\
\ominus\ \qquad \underline{-12x^2 - 24x} \\
\qquad\quad 0 + 18x + 36 \\
\ominus\ \qquad\quad \underline{18x + 36} \\
\qquad\qquad\quad 0
\end{array}
$$

**zu 5.12**

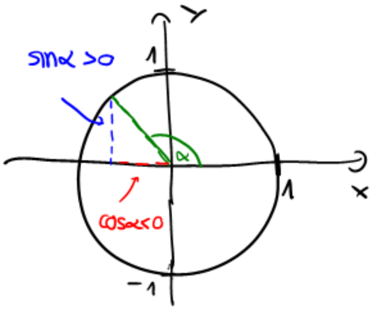


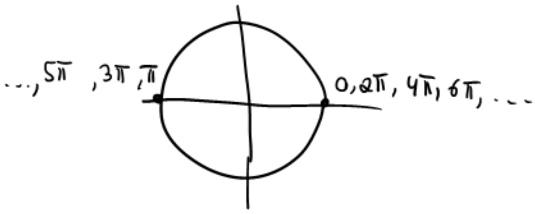



# 6. Trigonometrie

- $20° \mathrel{\hat{=}} 2\pi \cdot \frac{\cancel{20}}{18\,\cancel{360}} = \frac{\cancel{2}\pi}{\cancel{18}\,9} = \frac{\pi}{9}$
- $90° \mathrel{\hat{=}} \frac{\pi}{2}$

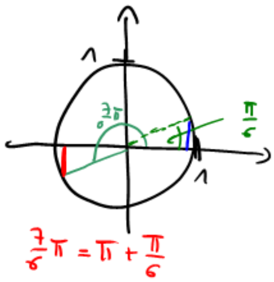


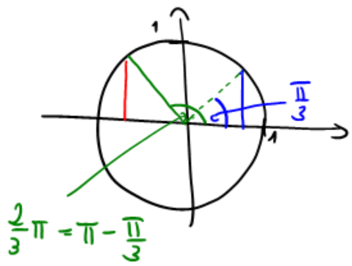

$\tan\alpha = \frac{\tan\alpha}{1} = \frac{\sin\alpha}{\cos\alpha}$ (Strahlensatz)




Bsp:

- $\sin\left(\frac{7}{6}\pi\right) = -\sin\left(\frac{\pi}{6}\right) = -\frac{1}{2}$
- $\sin\left(\frac{2}{3}\pi\right) = \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$



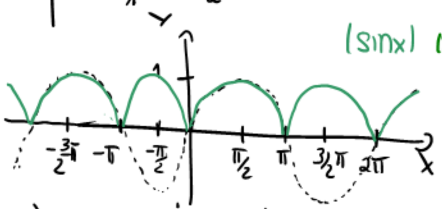




Bsp zu 6.3

- 


f ist 1-periodisch

- $f(x) = |\sin x|$

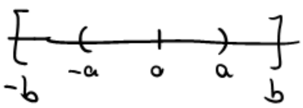



$|\sin x|$ ist $\pi$-periodisch

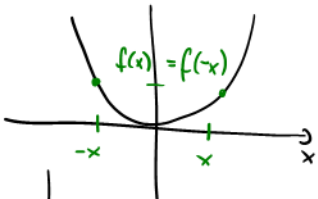
- $f(x) = \sin(2x)$ ist $\pi$-periodisch
  $f(x) = \sin\left(\frac{x}{2}\right)$ ist $4\pi$-periodisch

zu 6.4:

z.B. $I = (-a, a)$, $I = [-b, b]$,
$I = \mathbb{R}$




Bsp: $f: \mathbb{R} \to \mathbb{R}$, $f(x) = x^2$ ist gerade




$f: \mathbb{R} \to \mathbb{R}$ $f(x) = x^3$ ist ungerade,
denn $f(-x) = (-x)^3 = (-1)^3 \cdot x^3 = -x^3$
$= -f(x)$