

**Funktionen (Lösungen)**

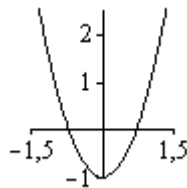
1.

- |   |  |   |   |
|---|--|---|---|
| a) $S_x(6; 0)$<br>$S_y(0; -3)$<br>$\varphi_x = 26,6^\circ$                      | b) $S_x(3; 0)$<br>$S_y(0; 3)$<br>$\varphi_x = 135,0^\circ$             | c) $S_x\left(-\frac{1}{2}; 0\right)$<br>$S_y(0; 1)$<br>$\varphi_x = 63,4^\circ$ | d) $S_x(-3; 0)$<br>$S_y(0; 2)$<br>$\varphi_x = 33,7^\circ$                      |
| e) $S_x\left(\frac{4}{3}; 0\right)$<br>$S_y(0; 2)$<br>$\varphi_x = 123,7^\circ$ | f) $S_x(-4; 0)$<br>$S_y(0; -\frac{8}{5})$<br>$\varphi_x = 158,2^\circ$ | g) $S_x(0; 0)$<br>$S_y(0; 0)$<br>$\varphi_x = 63,4^\circ$                       | h) $S_x(0; 0)$<br>$S_y(0; 0)$<br>$\varphi_x = 149,0^\circ$                      |
| i) $S_x(3; 0)$<br>$S_y(0; 2)$<br>$\varphi_x = 146,3^\circ$                      | j) $S_x(1; 0)$<br>$S_y(0; -4)$<br>$\varphi_x = 76,0^\circ$             | k) $S_x(3; 0)$<br>$S_y$ ex. nicht<br>$\varphi_x = 90^\circ$                     | l) $S_x$ ex. nicht<br>$S_y\left(0; \frac{1}{2}\right)$<br>$\varphi_x$ ex. nicht |

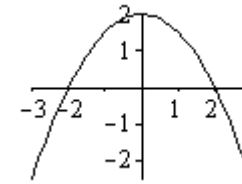
2. a)  $y = -3x + 5$     b)  $y = -x + 4$     c)  $y = 6x - 17$     d)  $y = 10x + 11$   
 e)  $y = -4x - 19$     f)  $y = -2$     g)  $y = 6x - 12$     h)  $y = -3x - 9$   
 i)  $y = -\frac{2}{7}x + 2$     j)  $y = 0,4142x - 0,1005$     k)  $y = -2,7475x + 13,7374$

3.

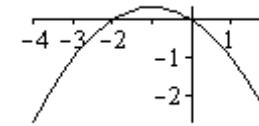
- a)  $S(0; -1)$   
 $x_1 = -\frac{\sqrt{2}}{2}$   
 $x_2 = \frac{\sqrt{2}}{2}$



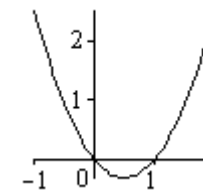
- b)  $S(0; 2)$   
 $x_1 = -2$   
 $x_2 = 2$



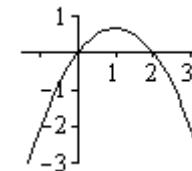
- c)  $S\left(-1; \frac{1}{3}\right)$   
 $x_1 = -2$   
 $x_2 = 0$



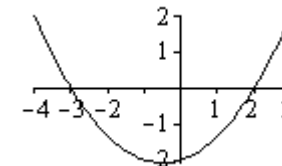
- d)  $S\left(\frac{1}{2}; -\frac{5}{16}\right)$   
 $x_1 = 0$   
 $x_2 = 1$



- e)  $S\left(1; \frac{2}{3}\right)$   
 $x_1 = 0$   
 $x_2 = 2$



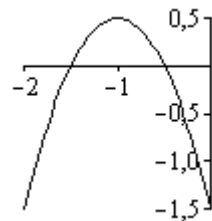
- f)  $S\left(-\frac{1}{2}; -\frac{25}{12}\right)$   
 $x_1 = -3$   
 $x_2 = 2$



g)  $S\left(-1; \frac{1}{2}\right)$

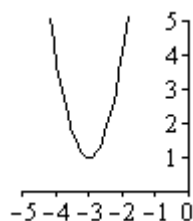
$x_1 = -\frac{3}{2}$

$x_2 = -\frac{1}{2}$



h)  $S(-3; 1)$

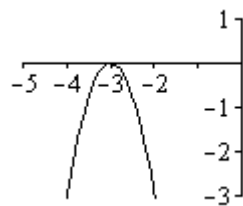
keine Nullstelle n



i)  $S(-3; 0)$

$x_1 = -3$

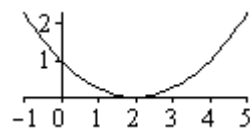
$x_2 = -3$



j)  $S(2; 0)$

$x_1 = 2$

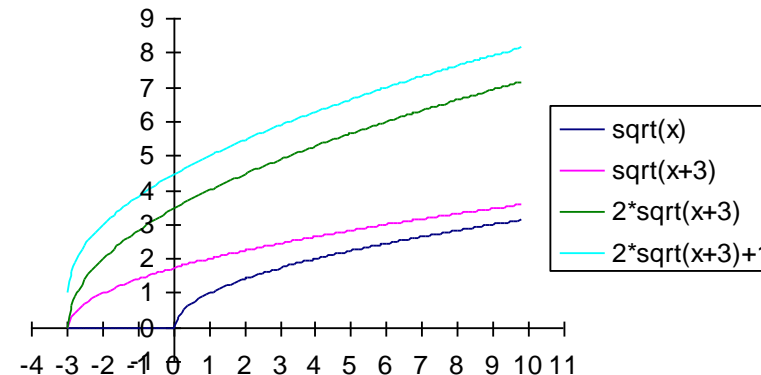
$x_2 = 2$



4. a) monoton wachsend; nach unten beschränkt

DB:  $x \geq -3$ ; WB:  $y \geq 1$

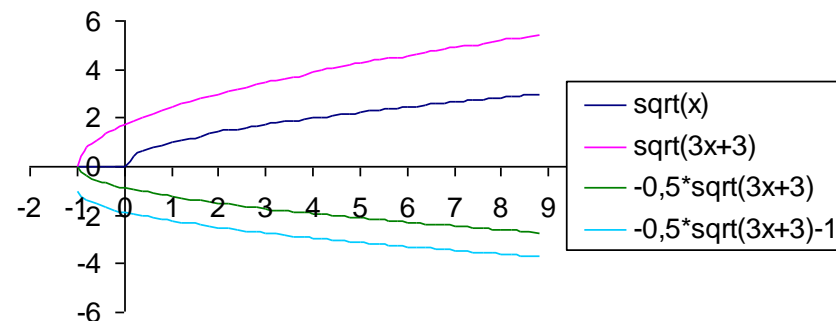
$S_x$  ex. nicht,  $S_y(0; 4,4641)$



b) monoton fallend; nach oben beschränkt

DB:  $x \geq -1$ ; WB:  $y \leq -1$

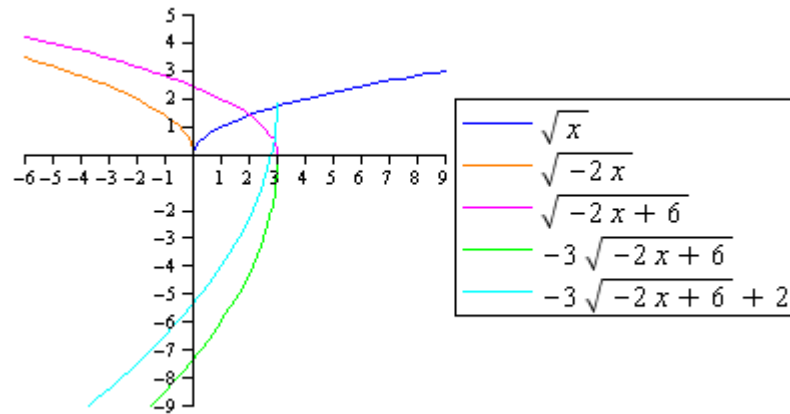
$S_x$  ex. nicht,  $S_y(0; -1,8660)$



c) monoton wachsend; nach oben beschränkt

DB:  $x \leq 3$ ; WB:  $y \leq 2$

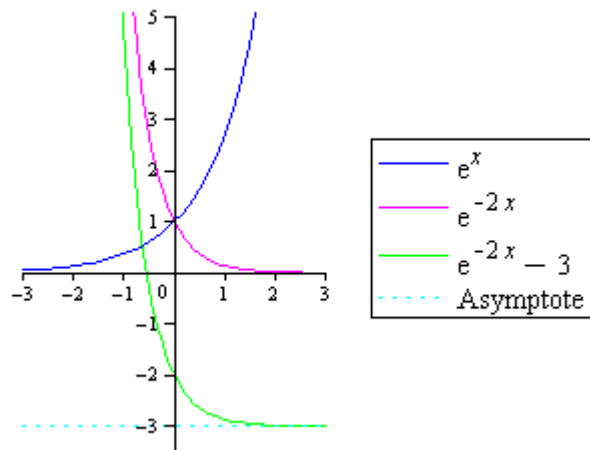
$S_x(2,7778; 0)$ ,  $S_y(0; -5,3485)$



d) monoton fallend; nach unten beschränkt

DB:  $x \in \mathbb{R}$ ; WB:  $y > -3$

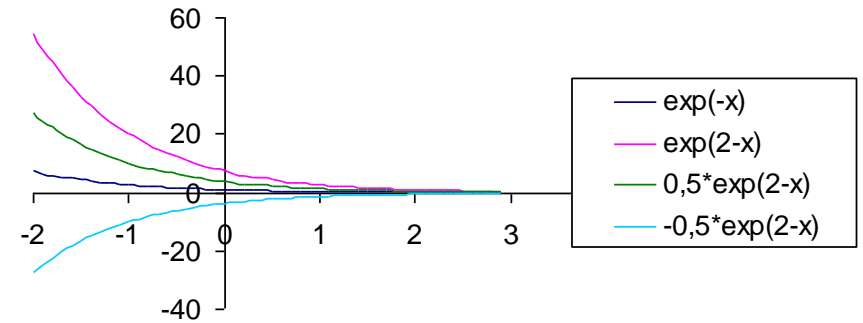
$S_x(-0,5493; 0)$ ,  $S_y(0; -2)$



e) monoton wachsend; nach oben beschränkt

DB:  $x \in \mathbb{R}$ ; WB:  $y < 0$

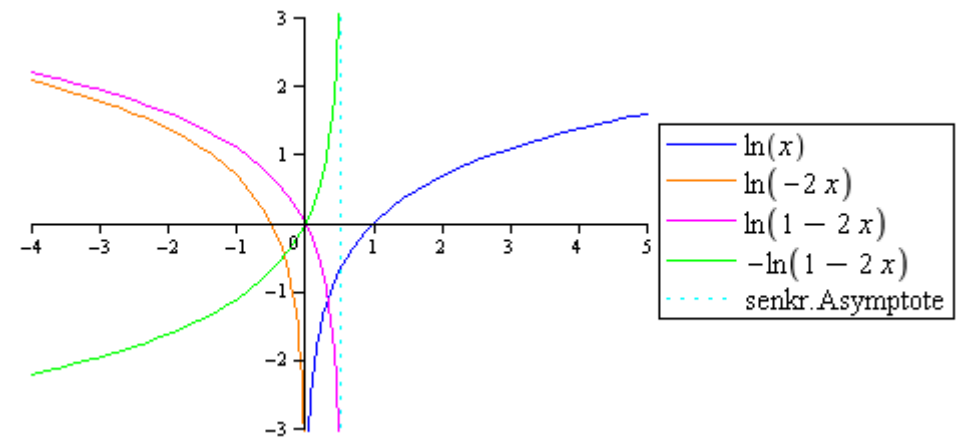
$S_x$  ex. nicht,  $S_y(0; -3,6945)$



f) monoton wachsend; unbeschränkt

DB:  $x < 0,5$ ; WB:  $y \in \mathbb{R}$

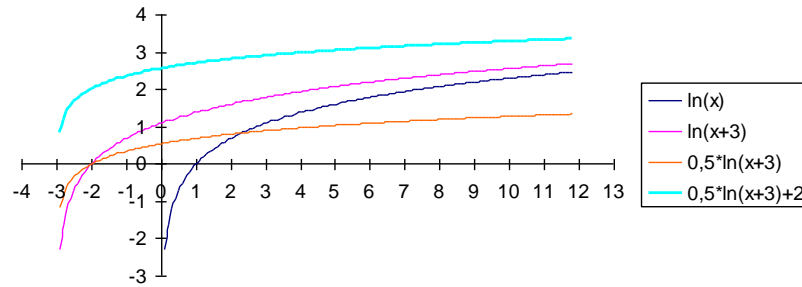
$S_x(0; 0)$ ,  $S_y(0; 0)$



g) monoton wachsend; unbeschränkt

DB:  $x > -3$ ; WB:  $y \in \mathbb{R}$

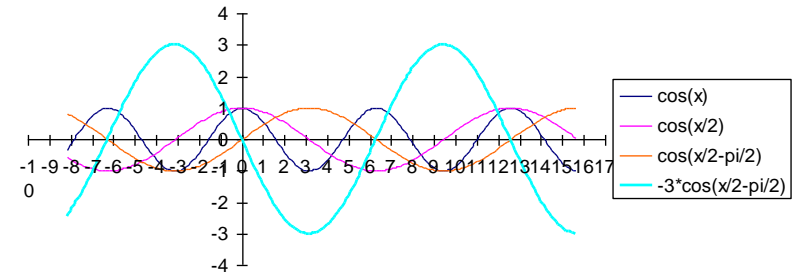
$S_x(-2,9817; 0)$ ,  $S_y(0; 2,5493)$



i) keine durchgängige Monotonie (nur abschnittsweise);  
nach oben und unten beschränkt

DB:  $x \in \mathbb{R}$ ; WB:  $-3 \leq y \leq 3$

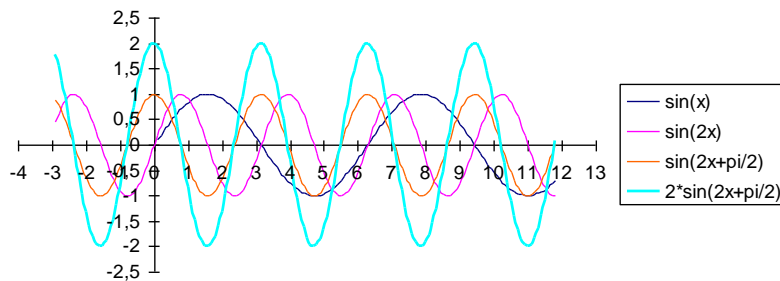
$S_x(2k\pi; 0)$ ,  $S_y(0; 0)$



h) keine durchgängige Monotonie (nur abschnittsweise);  
nach oben und unten beschränkt

DB:  $x \in \mathbb{R}$ ; WB:  $-2 \leq y \leq 2$

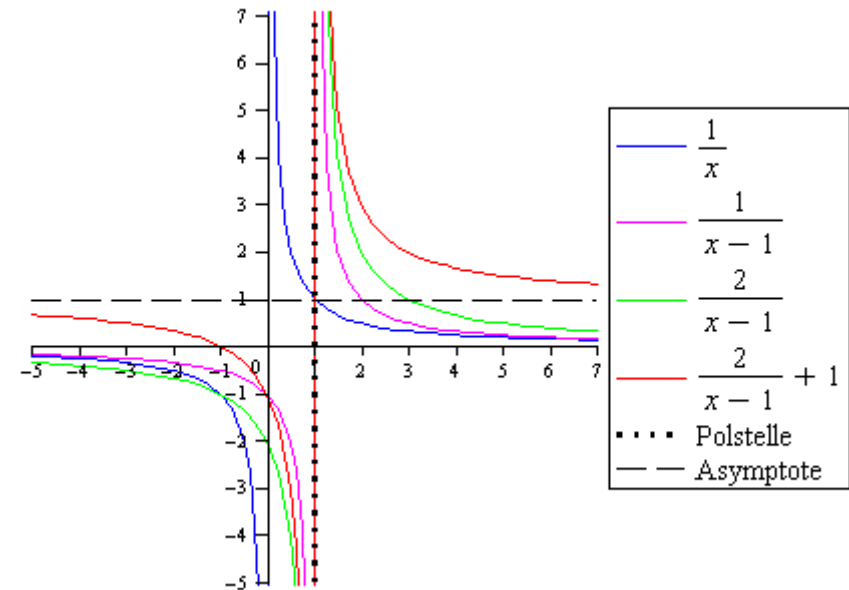
$S_x\left(\frac{2k-1}{4}\pi; 0\right)$  mit  $k = 0, \pm 1, \pm 2, \dots$ ,  $S_y(0; 2)$



j) vor und nach der Polstelle ( $x = 1$ ) monoton fallend;  
unbeschränkt;

DB:  $x \in \mathbb{R} \wedge x \neq 1$ ; WB:  $y \in \mathbb{R} \wedge y \neq 1$

$S_x(-1; 0)$ ,  $S_y(0; -1)$



k) bis Polstelle ( $x = -1$ ) monoton fallend, danach monoton wachsend;  
 nach oben beschränkt;  
 DB:  $x \in \mathbb{R} \wedge x \neq 1$ ; WB:  $y < 2$   
 $S_{x1} (-0,2929; 0)$ ,  $S_{x2} (-1,7071; 0)$ ,  $S_y (0; 1)$

