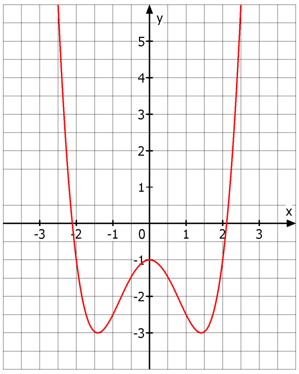
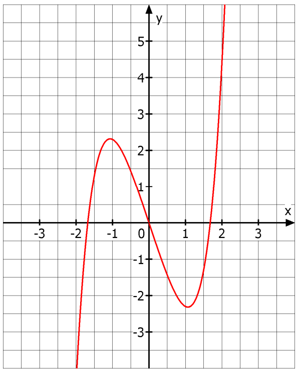
Mathematik * Jahrgangsstufe 10 * Eigenschaften ganzrationaler Funktionen

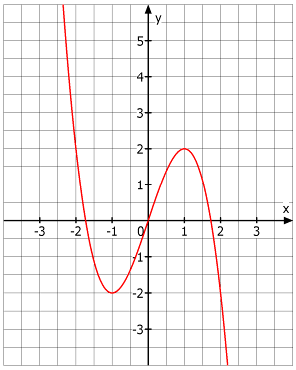
In der Abbildung sind die Graphen verschiedener ganzrationaler Funktionen dargestellt.
Was kann man über die Anzahl der Nullstellen sagen?
Welche Symmetrieeigenschaften kann man – auch schon am Funktionsterm – erkennen?
Wovon hängt das Verhalten von f(x) für $x \to +\infty$ bzw. $x \to -\infty$ ab?



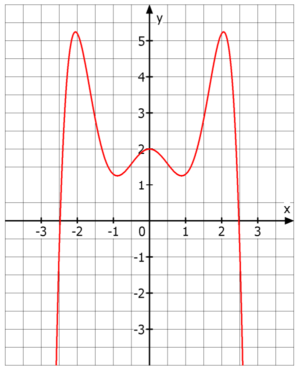
$f(x) = 0,5x^4 - 2x^2 - 1$



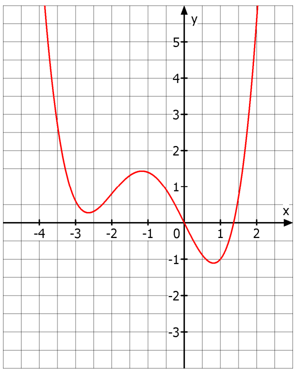
$f(x) = 0,2x^5 + 0,5x^3 - 3x$



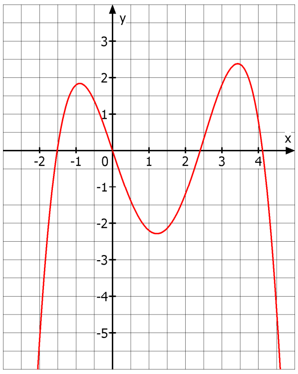
$f(x) = -x^3 + 3x$



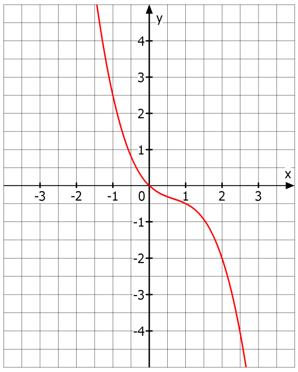
$f(x) = -0,2x^6 + 1,5x^4 - 2x^2 + 2$



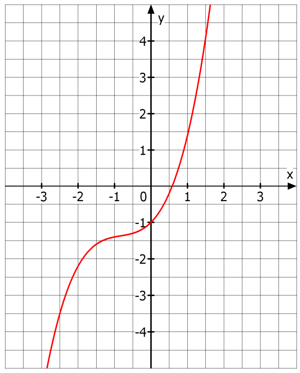
$f(x) = 0,2x^4 + 0,8x^3 - 2x$



$f(x) = -0,2x^4 + x^3 - 3x$



$f(x) = -0,5x^3 + x^2 - x$



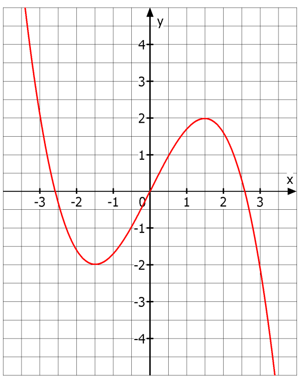
$f(x) = 0,4x^3 + x^2 + x - 1$

Aufgabe:
Ordnen Sie den vier abgebildeten Graphen jeweils einen passenden Funktionsterm aus dem angegebenem „Angebot“ zu! Begründen Sie auch, warum andere Funktionsterme nicht passen.

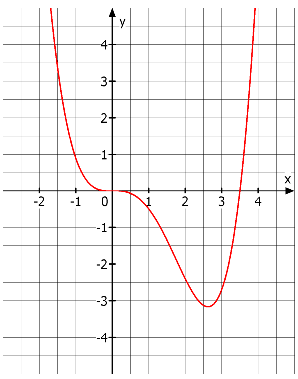
$f_1(x) = 0,3x^3 + 2x$; $f_2(x) = -0,3x^3 + 2x + 1$; $f_3(x) = -0,3x^3 + 2x$; $f_4(x) = -0,3x^3 + 2x^2$

$f_5(x) = 0,5x^3 + 1,5x^2 + 1$; $f_6(x) = -0,25x^4 + 2x$; $f_7(x) = -0,25x^4 + 2x^2$; $f_8(x) = x^2 + 1,5x + 1$;

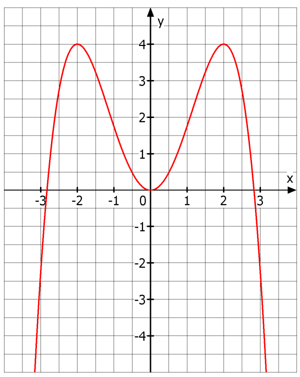
$f_9(x) = 0,2x^4 - 0,7x^3$; $f_{10}(x) = -0,2x^4 + 0,7x^3$; $f_{11}(x) = 0,2x^4 - x^2$; $f_{12}(x) = -0,2x^4 + 2x^2 + 1$



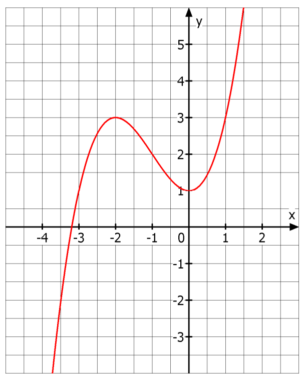
Graph 1



Graph 2



Graph 3



Graph 4