

1 Studi di funzione

1. $f(x) = \frac{|2x - 3|}{x^2 - 3x + 2}$

Svolgimento

Dominio il denominatore deve essere diverso da zero e quindi $x \neq -1, x \neq 2$.

Limiti alla frontiera (sono standard)

$$\begin{aligned}\lim_{x \rightarrow -\infty} f(x) &= 0^+, & \lim_{x \rightarrow +\infty} f(x) &= 0^+ \\ \lim_{x \rightarrow -1^-} f(x) &= +\infty, & \lim_{x \rightarrow -1^+} f(x) &= -\infty \\ \lim_{x \rightarrow 2^-} f(x) &= -\infty, & \lim_{x \rightarrow 2^+} f(x) &= +\infty\end{aligned}$$

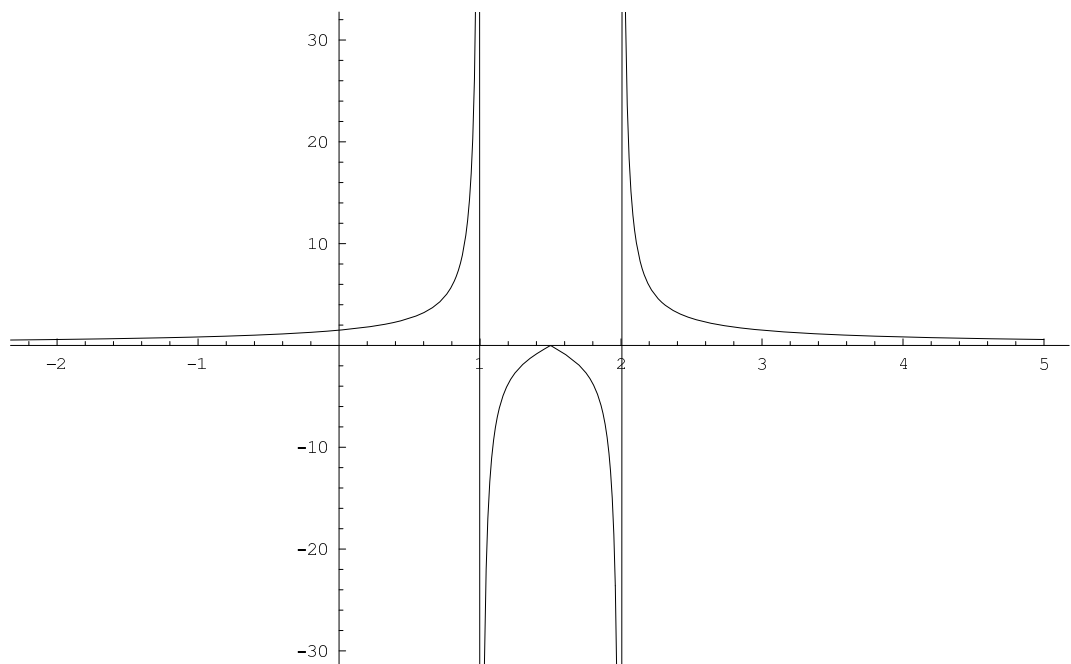
Segno

Il numeratore è sempre positivo, il segno quindi dipende solo dal denominatore. Studiando il segno del denominatore si ricava che $f(x) > 0$ se $x \notin [-1, 2]$, mentre $f(x) \leq 0$ se $x \in]-1, 2[$. L'unico punto in cui $f(x) = 0$ è $x = 3/2$.

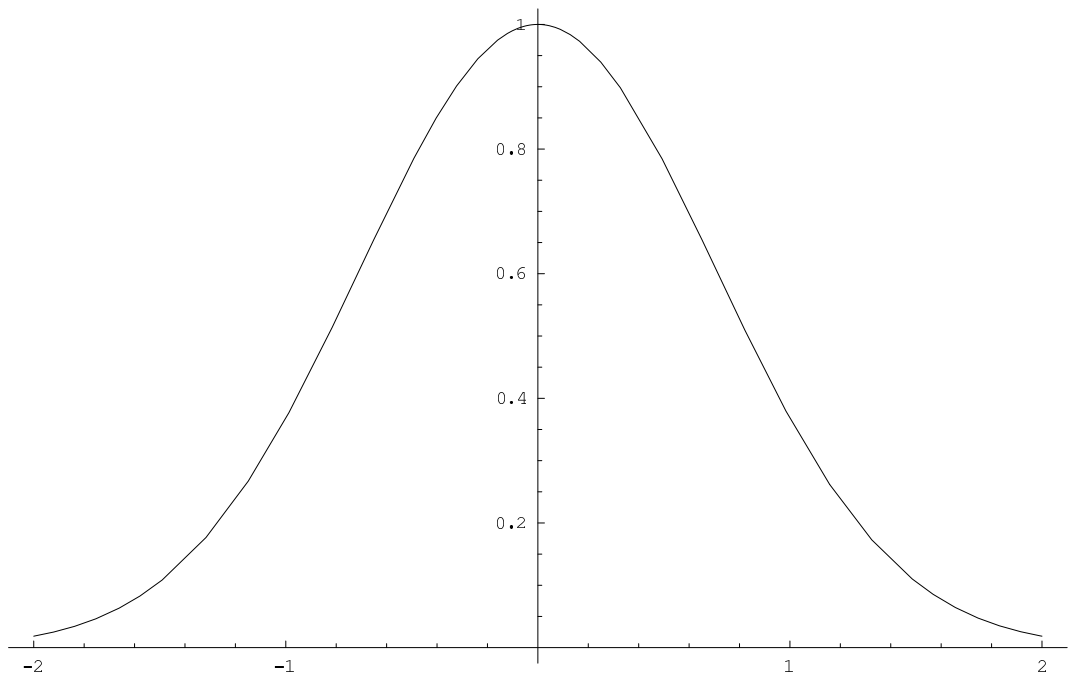
Monotonia

Calcoliamo la derivata: (se $x \neq -1, x \neq 2$ e $x \neq 3/2$)

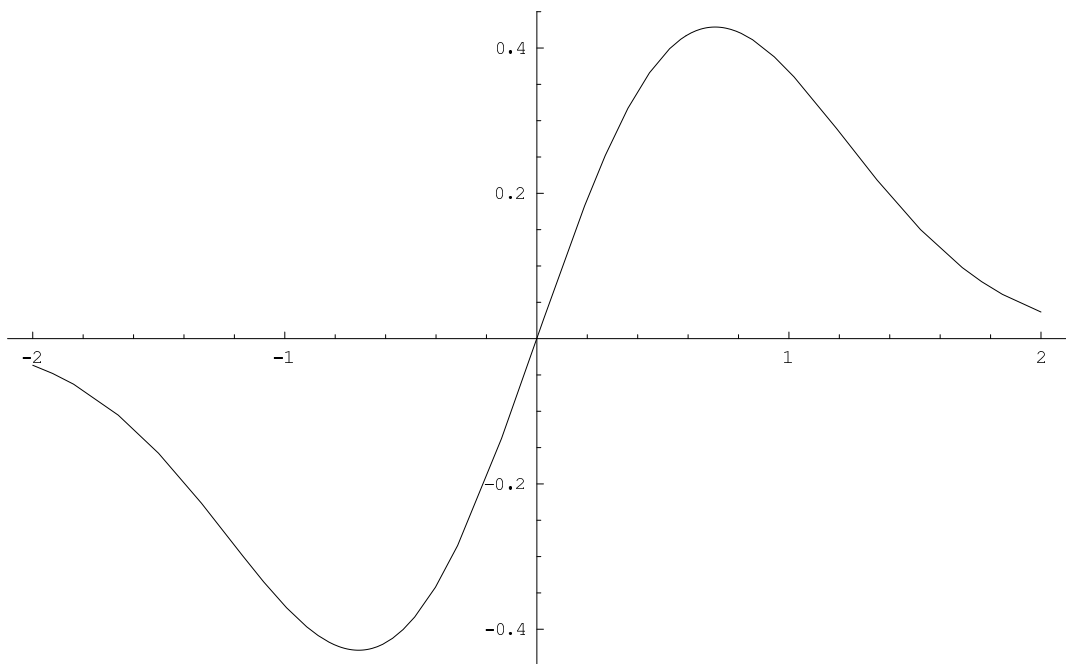
$$f'(x) = \frac{2\operatorname{sgn}(2x - 3)(x^2 - 3x + 2) - |2x - 3|(2x - 3)}{(x^2 - 3x + 2)^2}$$



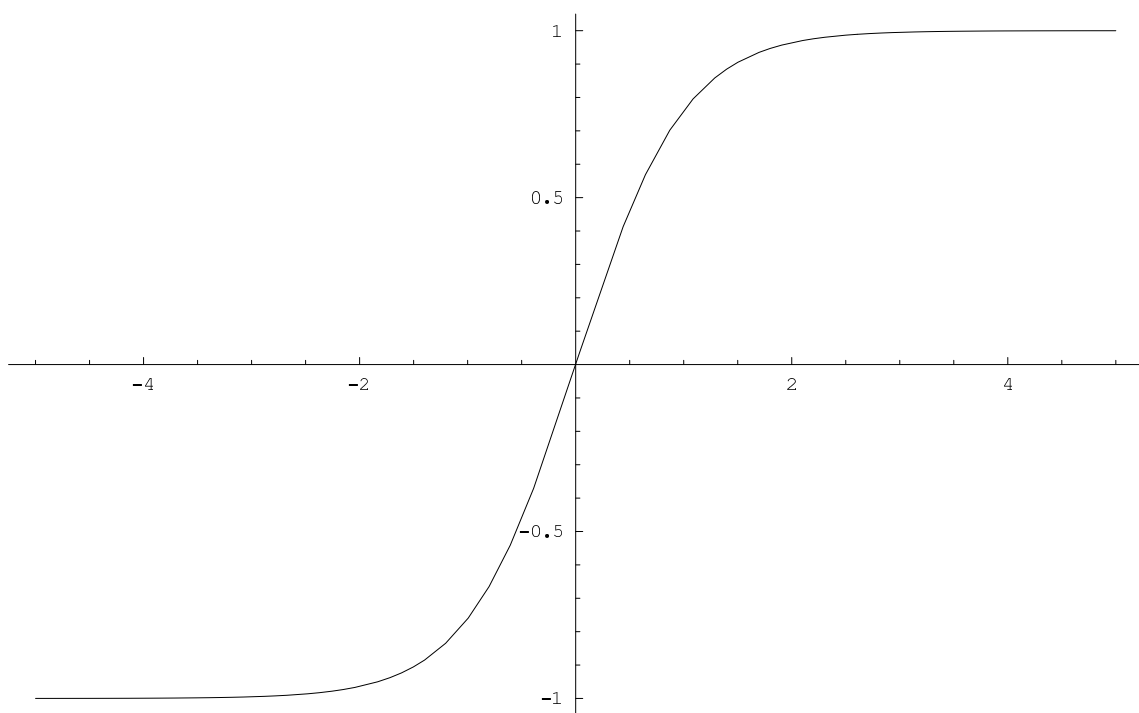
2. $f(x) = e^{-x^2}$



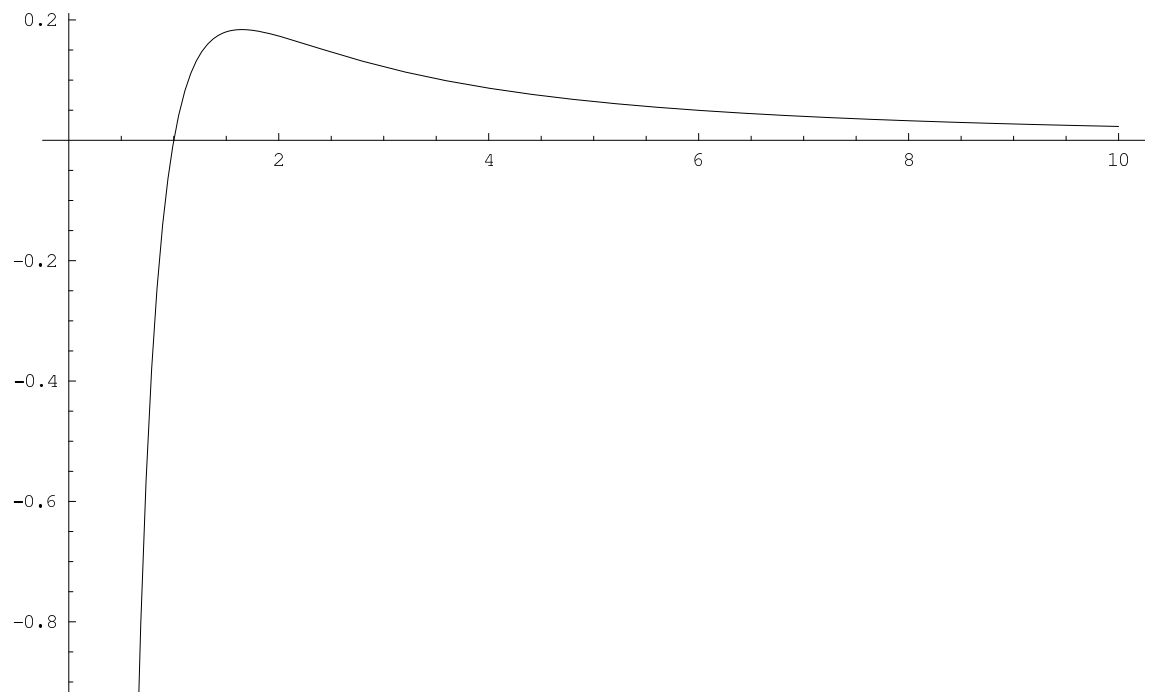
3. $f(x) = xe^{-x^2}$



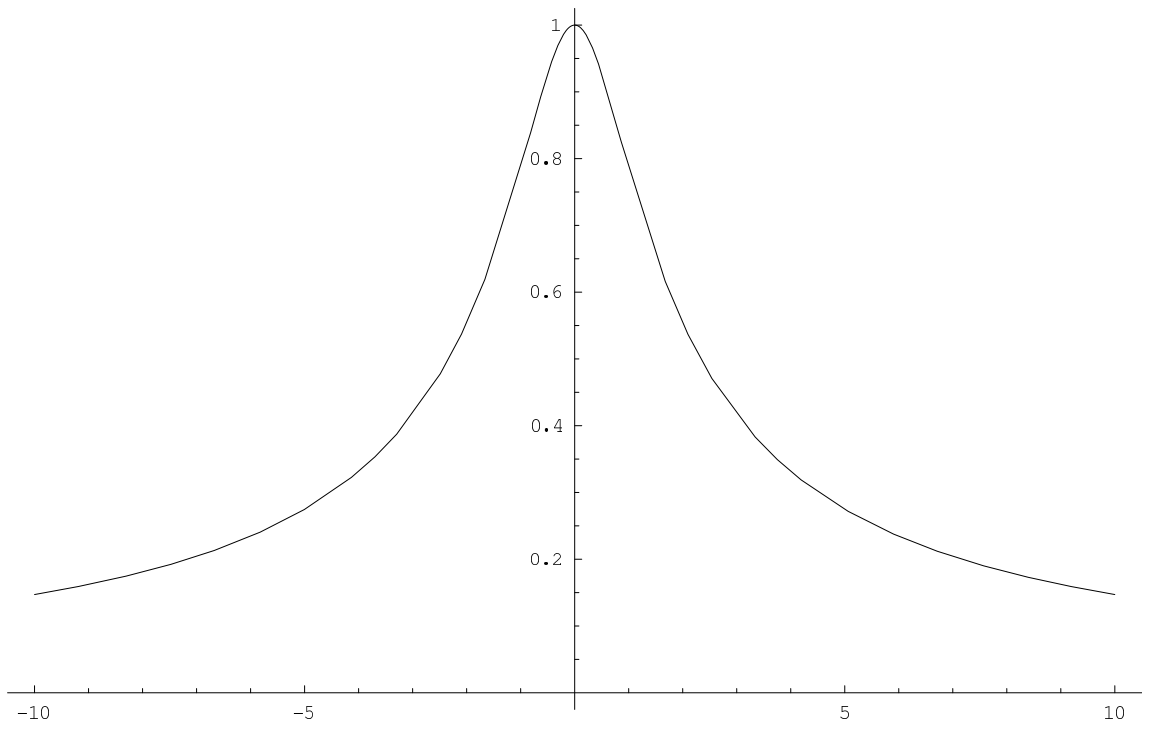
4. $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \tanh(x)$



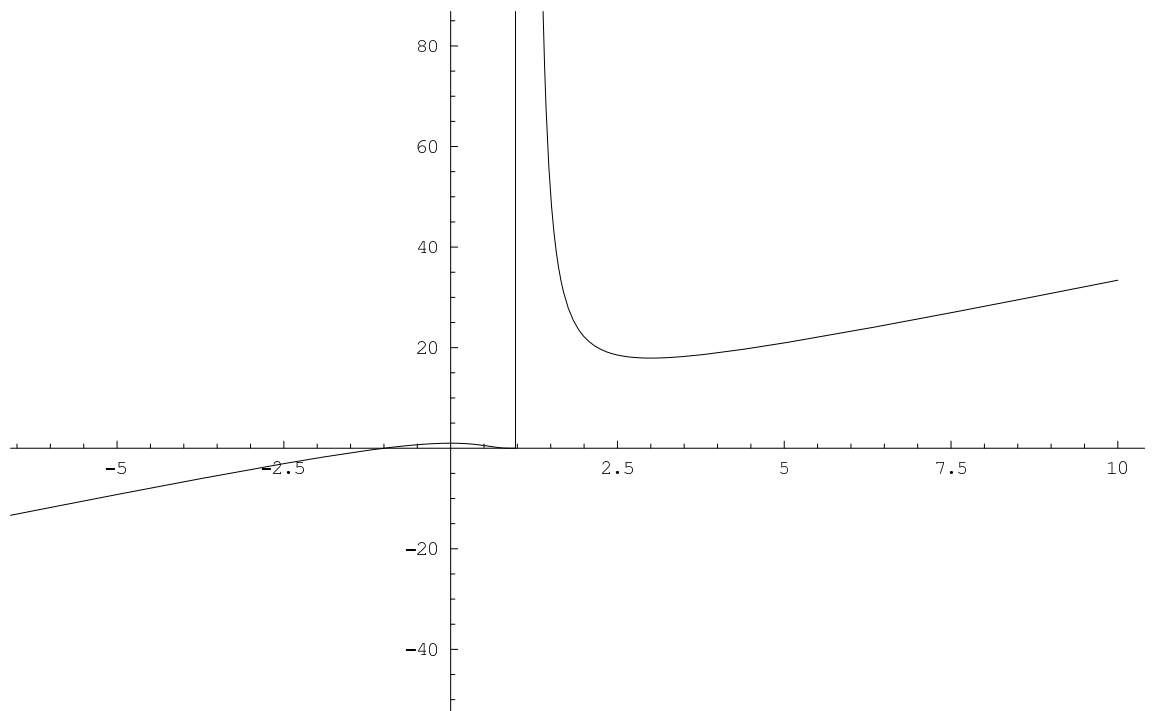
5. $f(x) = \frac{\ln(x)}{x^2}$



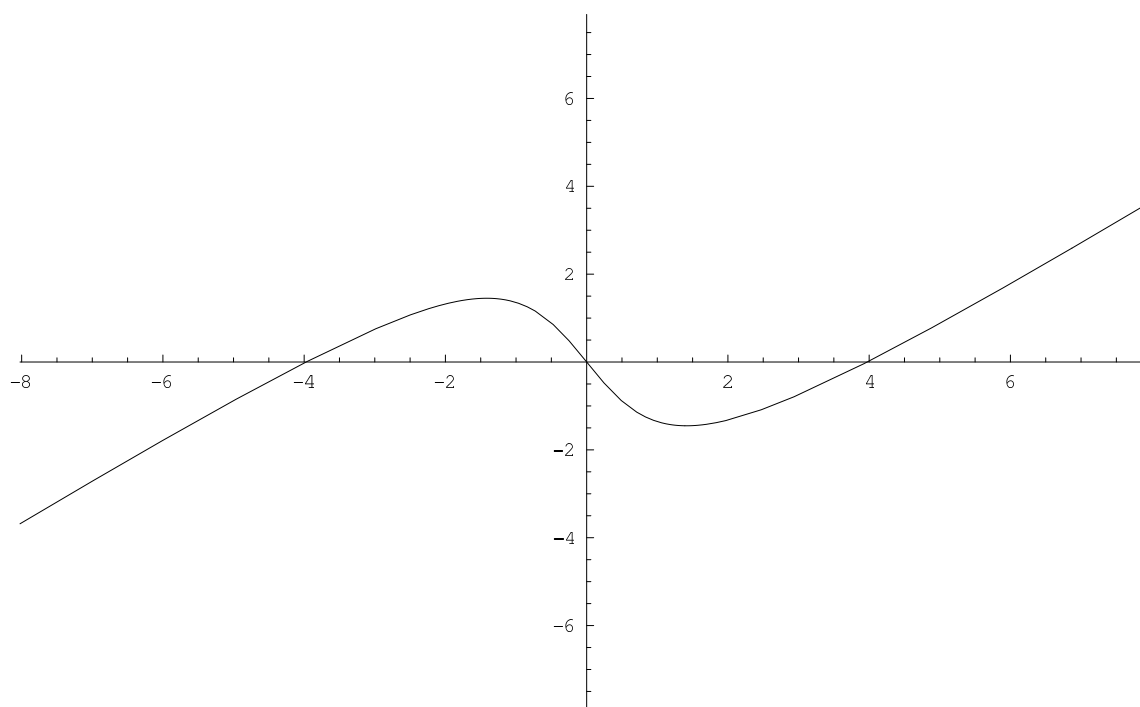
6. $f(x) = \frac{\arctan x}{x}$



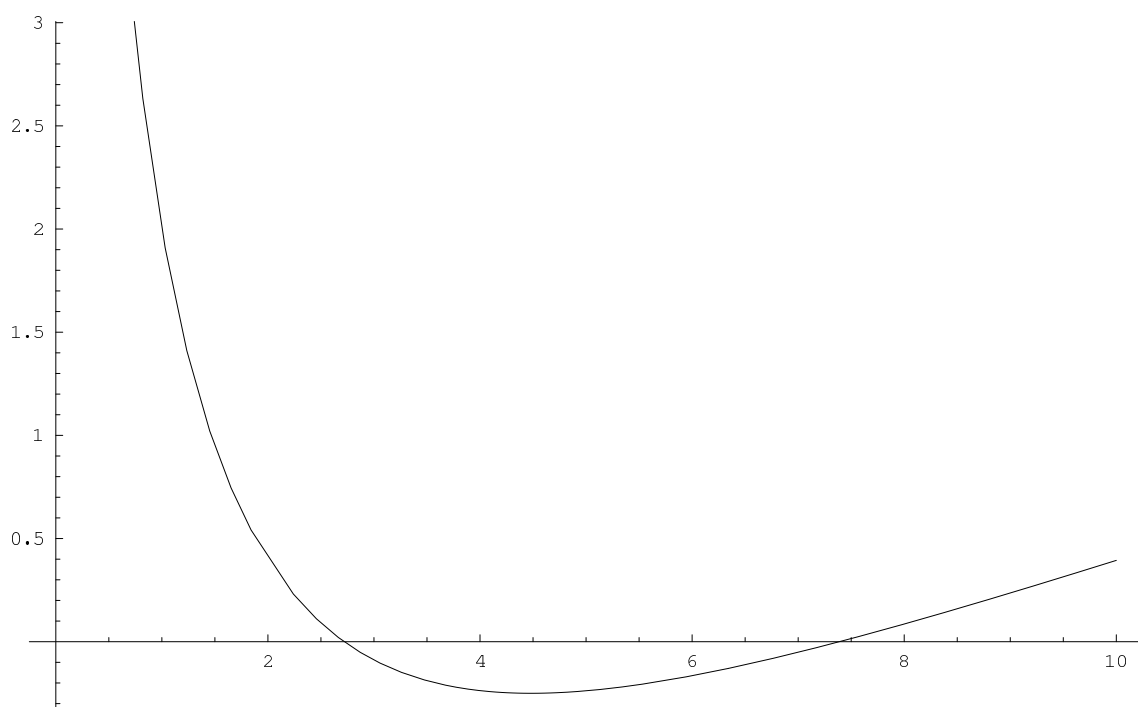
7. $f(x) = (x + 1)e^{\frac{x}{x-1}}$



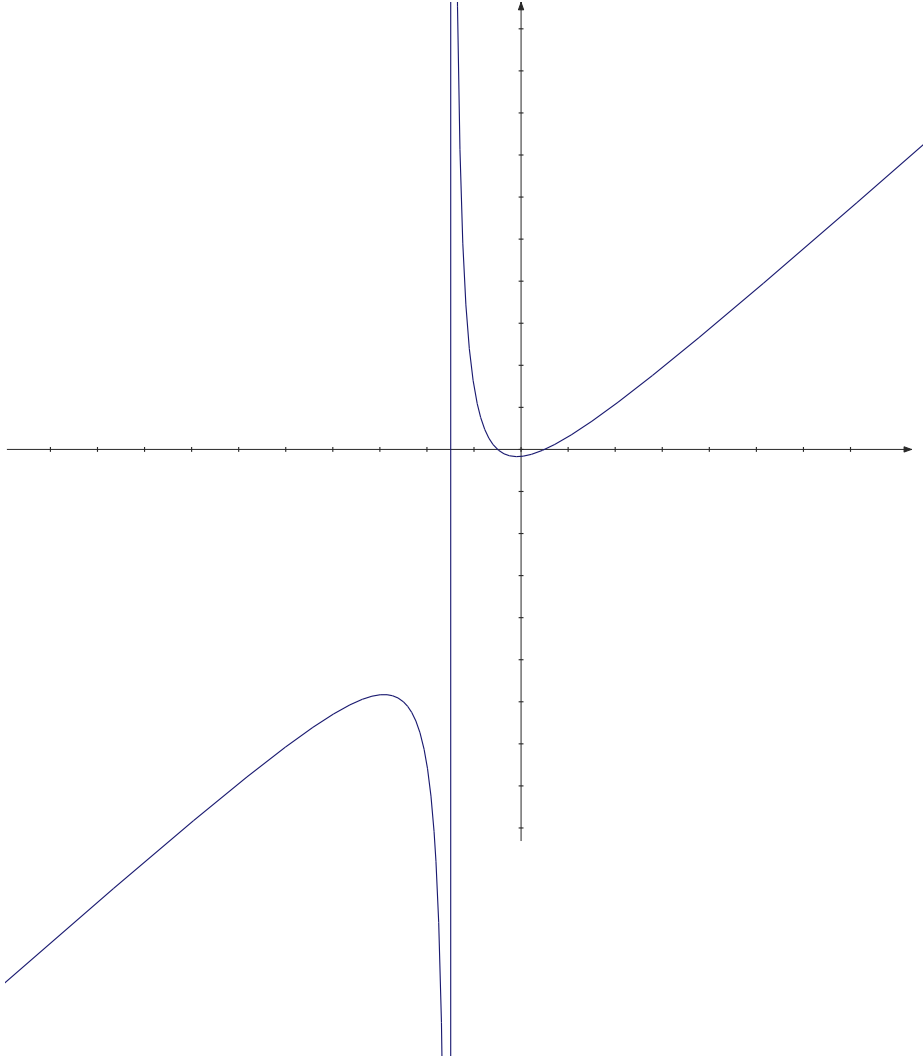
9. $f(x) = x - 3 \arctan(x)$



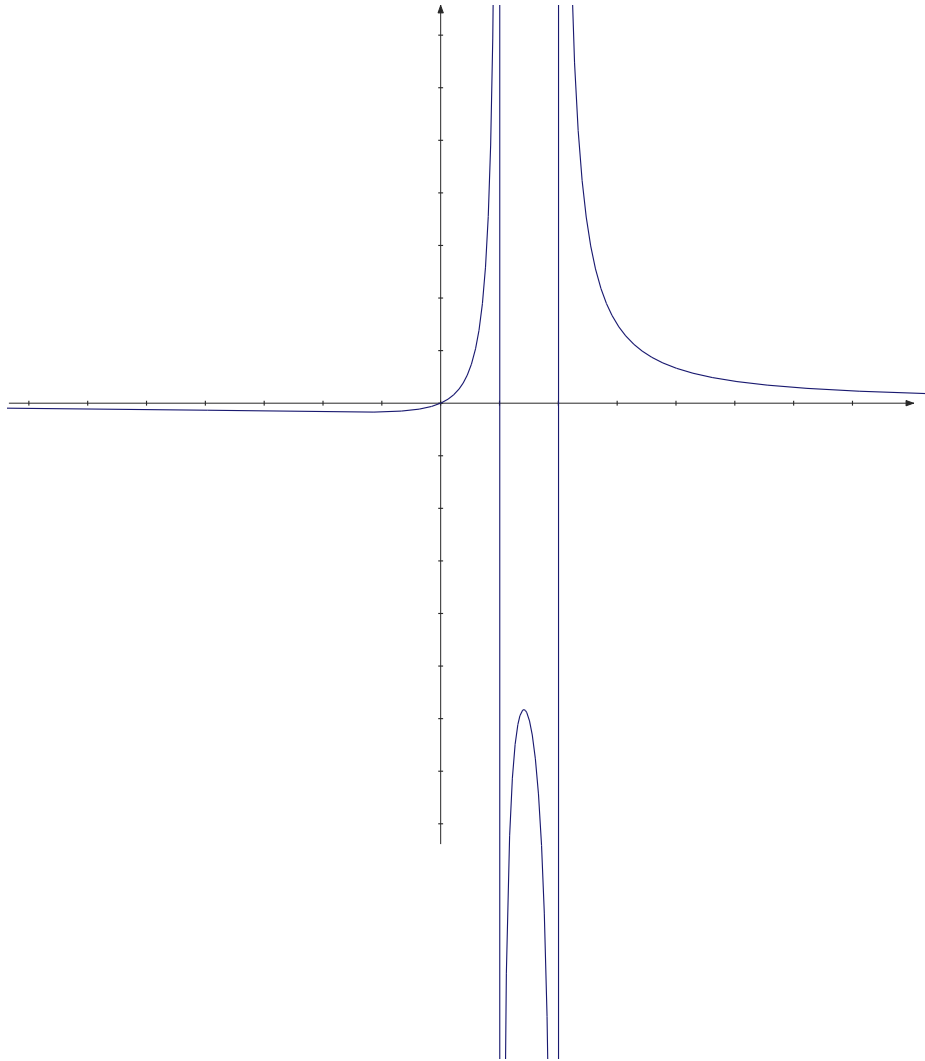
10. $f(x) = \ln^2(x) - 3\ln(x) + 2$



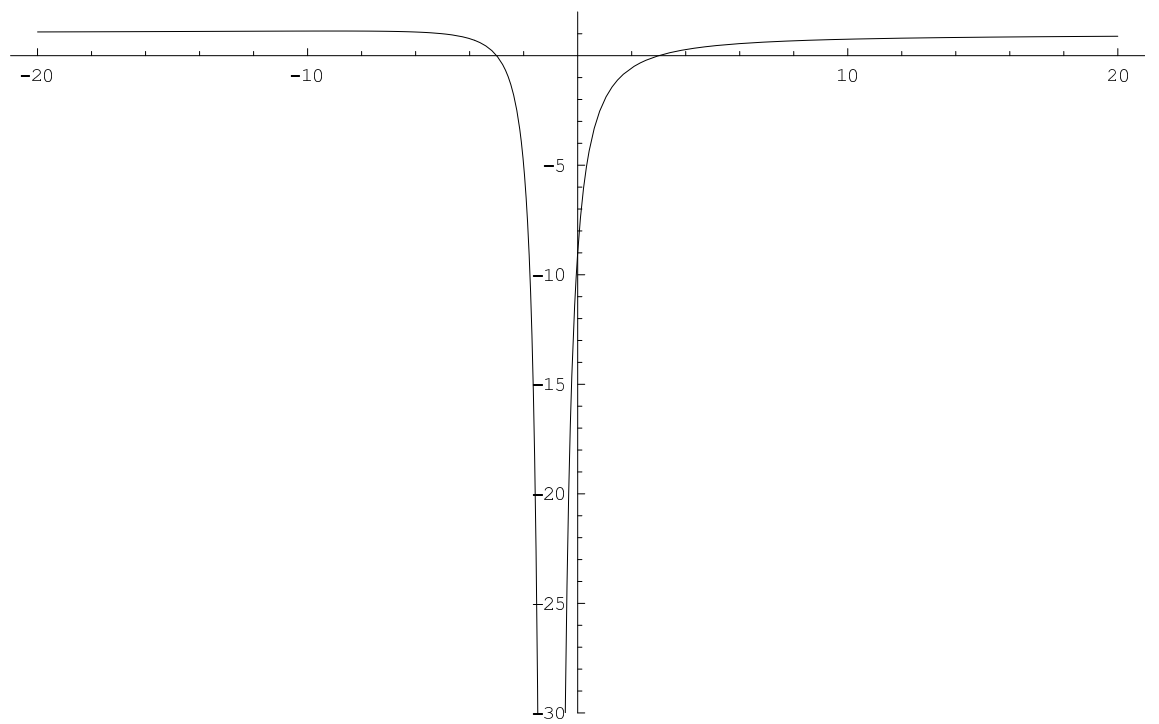
$$11. f(x) = \frac{x^2 - 1}{x + 3}$$



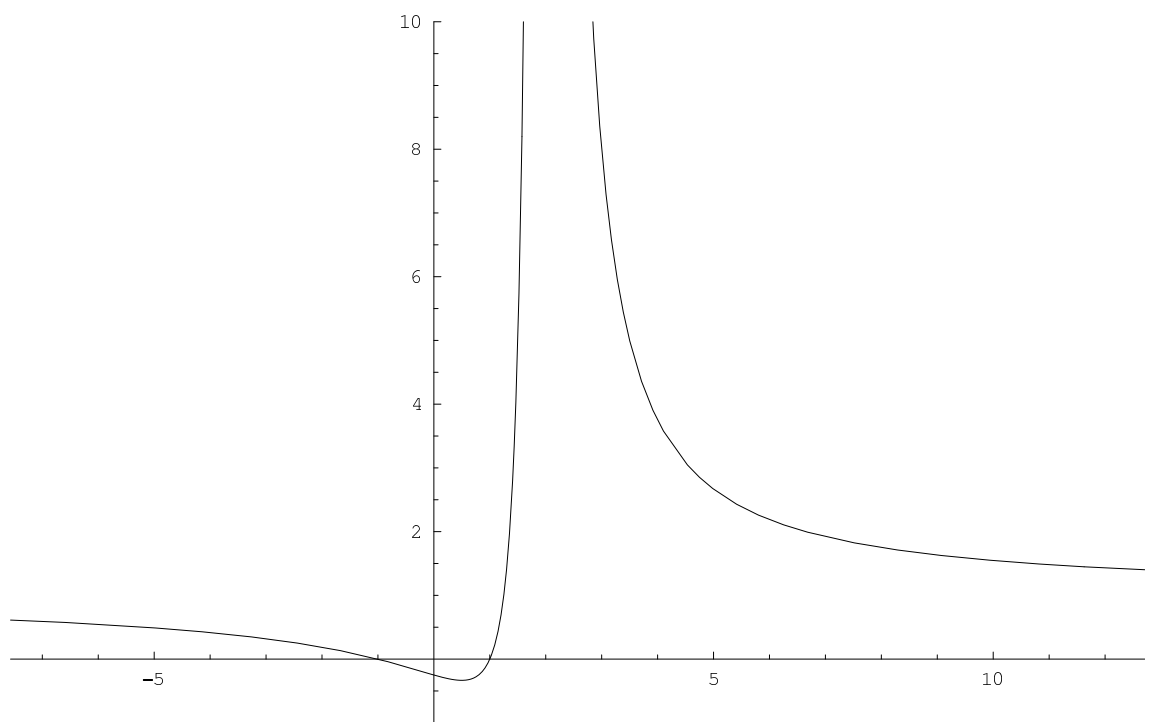
$$12. f(x) = \frac{x}{x^2 - 3x + 2}$$



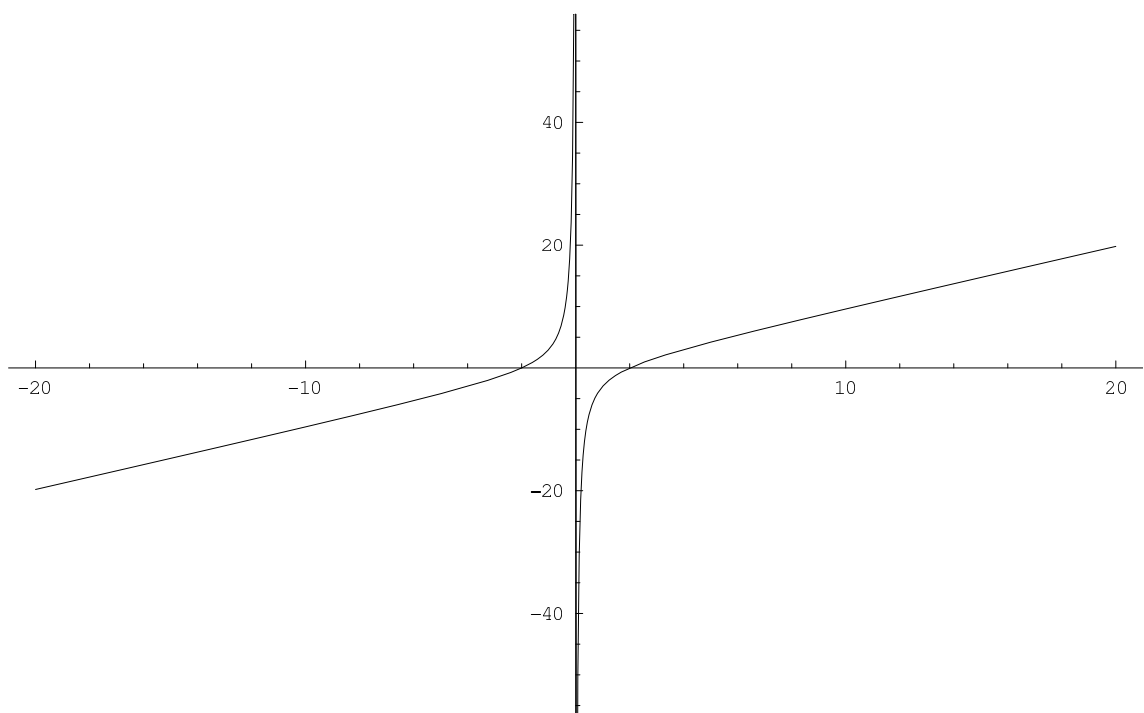
13. $f(x) = \frac{x^2 - 9}{(x + 1)^2}$



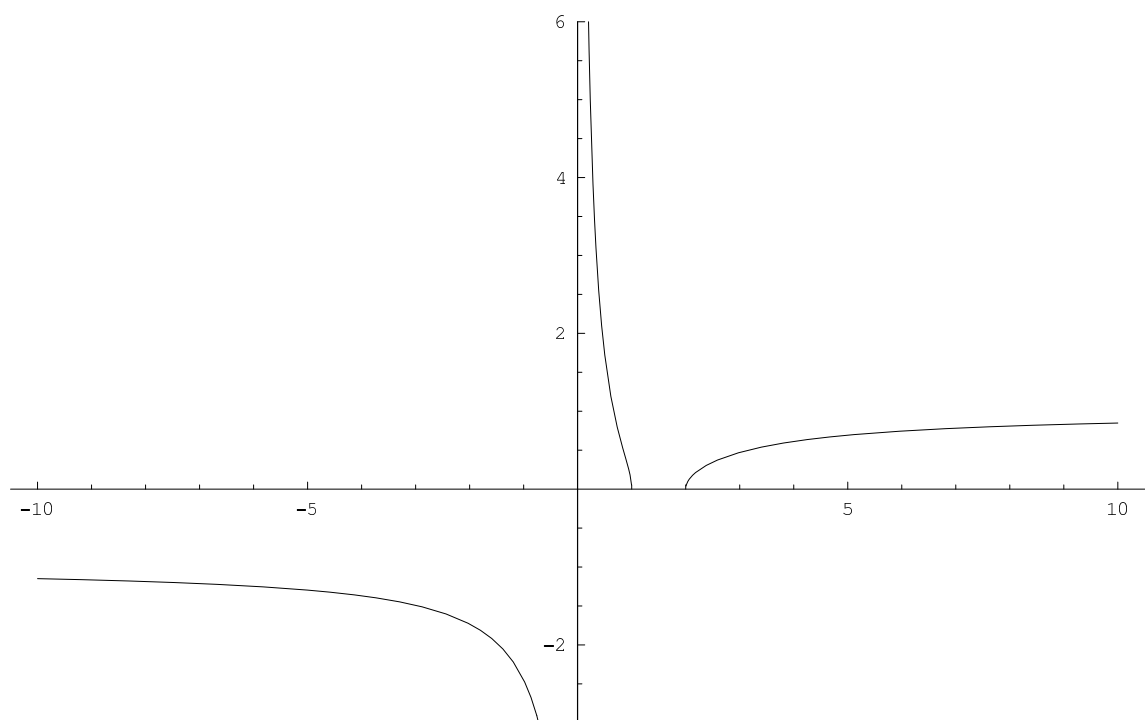
14. $f(x) = \frac{x^2 - 1}{(x - 2)^2}$



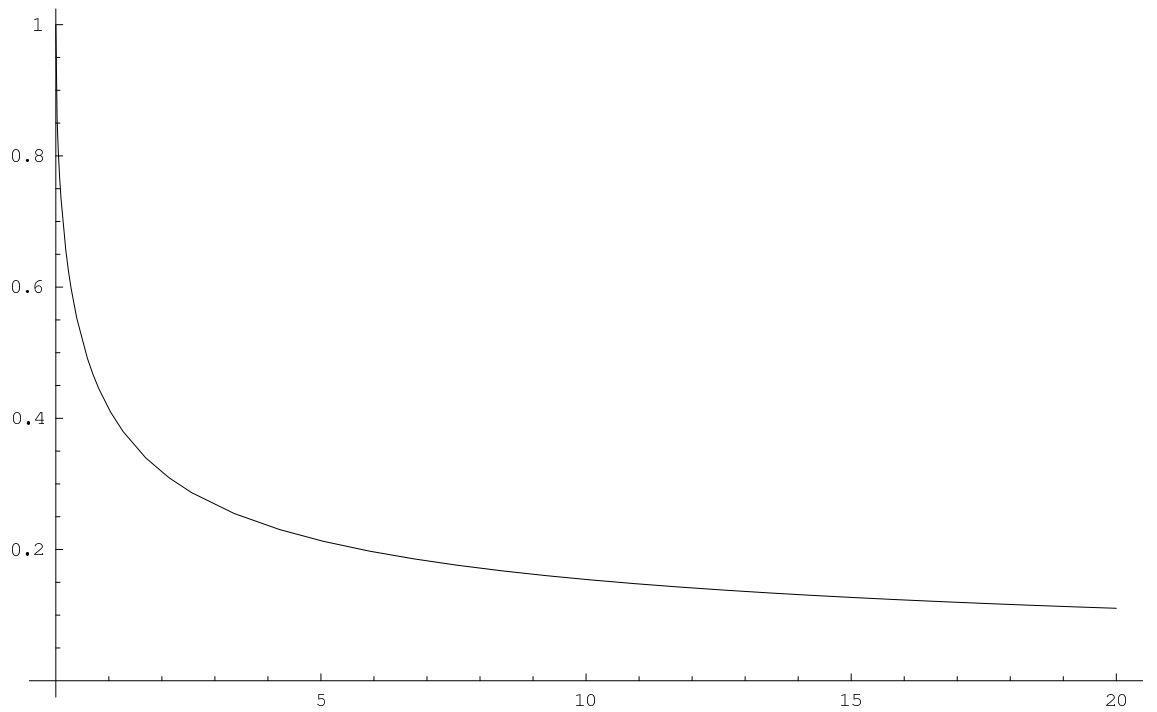
15. $f(x) = \frac{x^3 - x^2 - 4x + 4}{x^2 - x}$



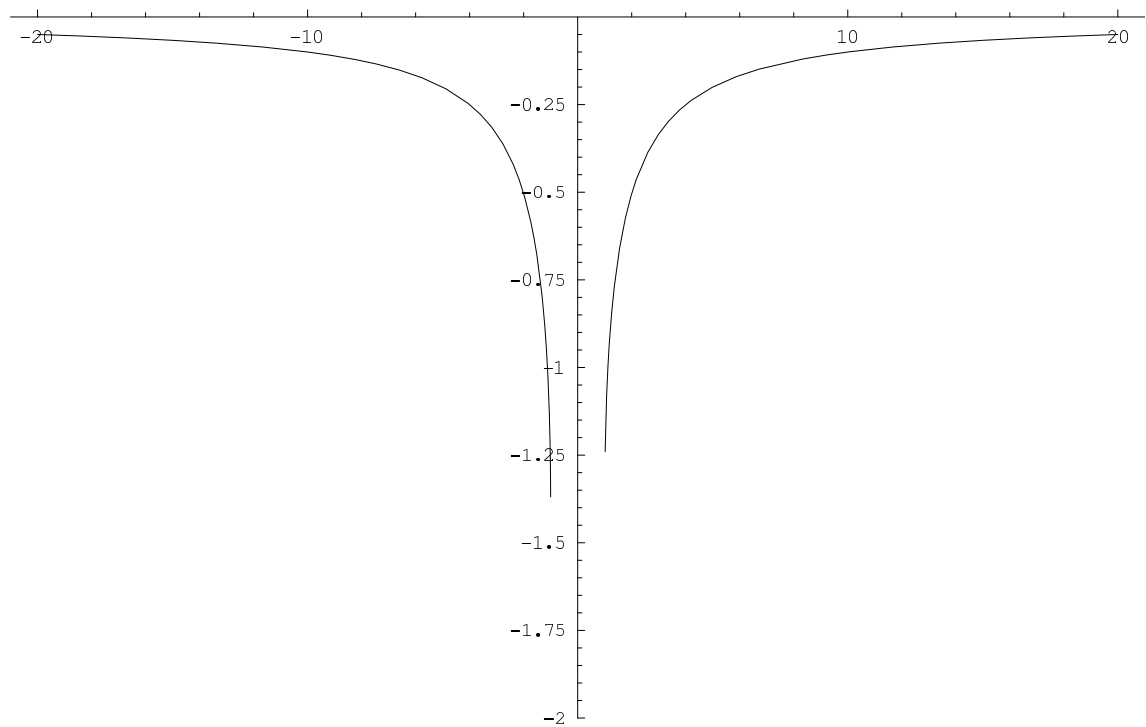
16. $f(x) = \frac{\sqrt{x^2 - 3x + 2}}{x}$



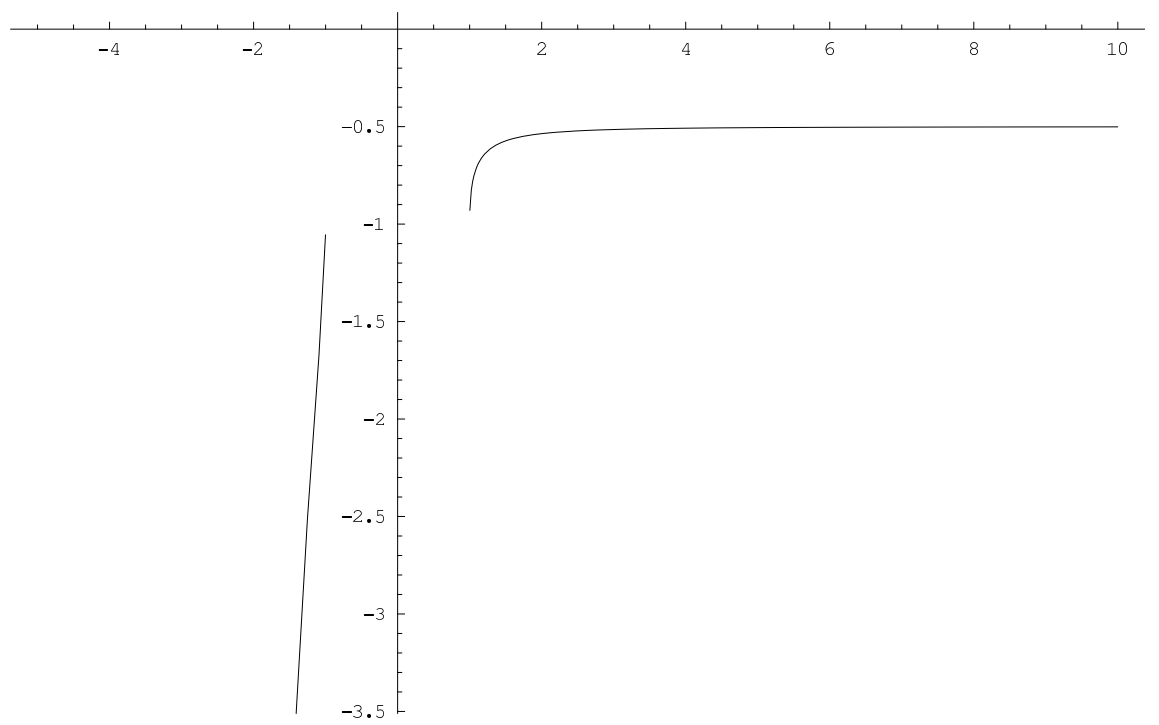
17. $f(x) = \sqrt{x+1} - \sqrt{x}$



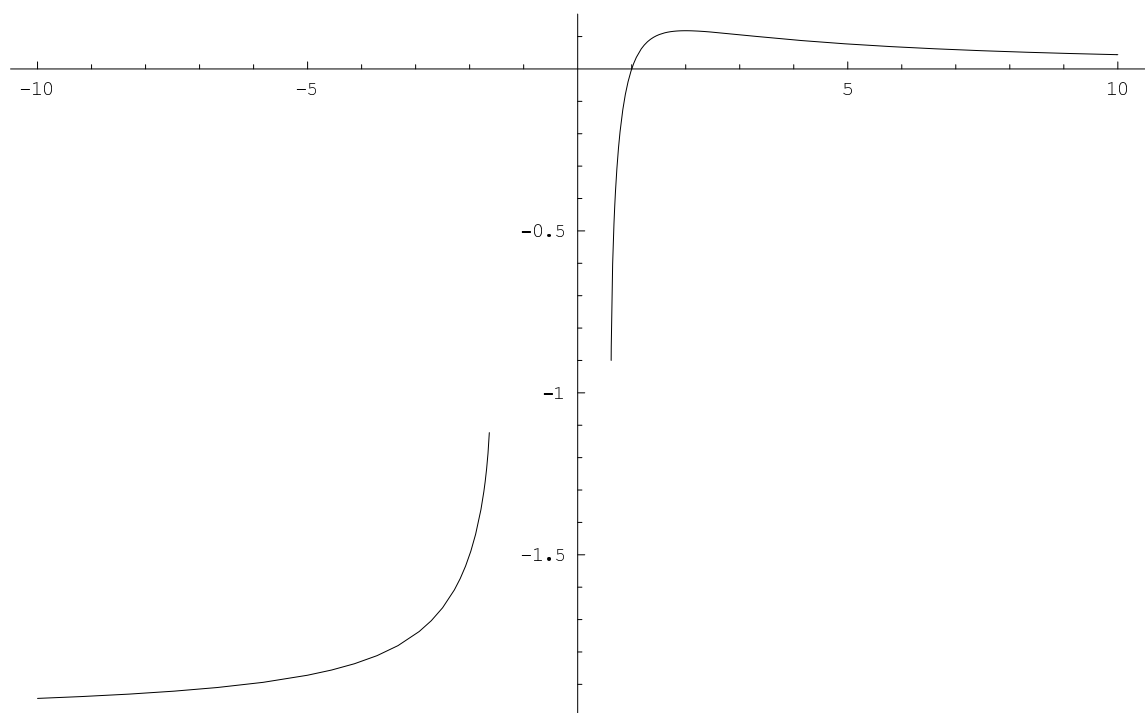
18. $f(x) = \sqrt{x^2 - 1} - \sqrt{x^2 + 1}$



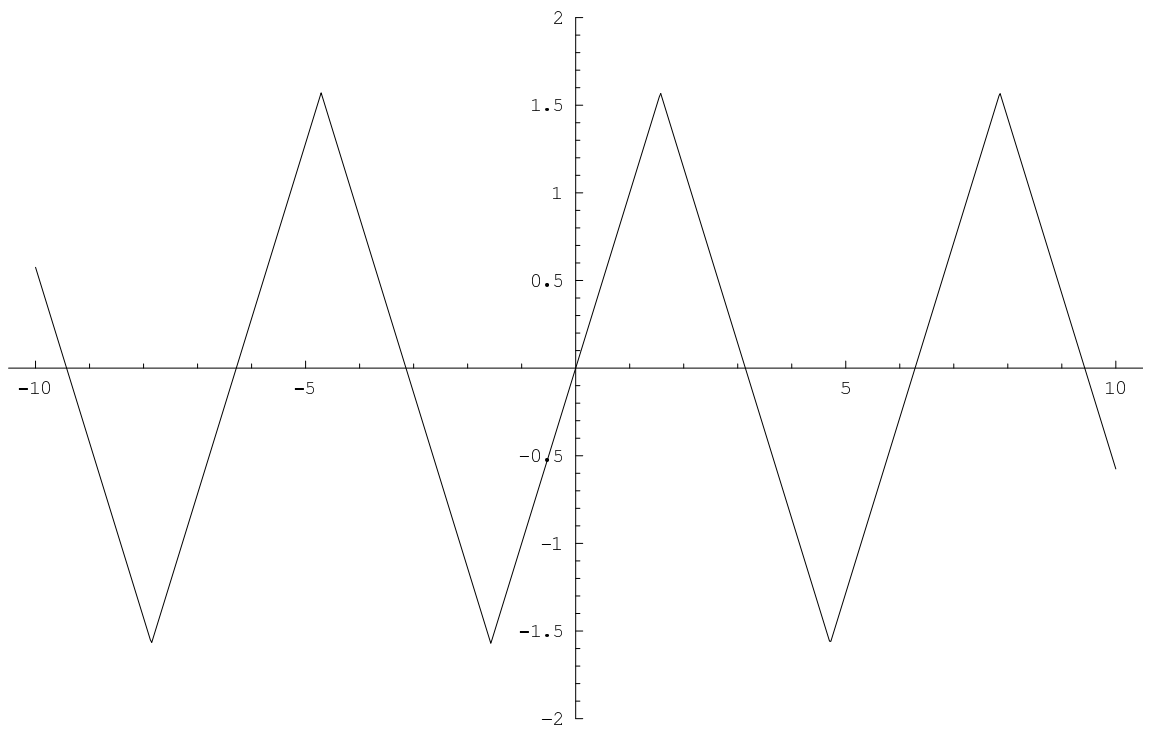
19. $f(x) = x\sqrt{x^2 - 1} - x^2$



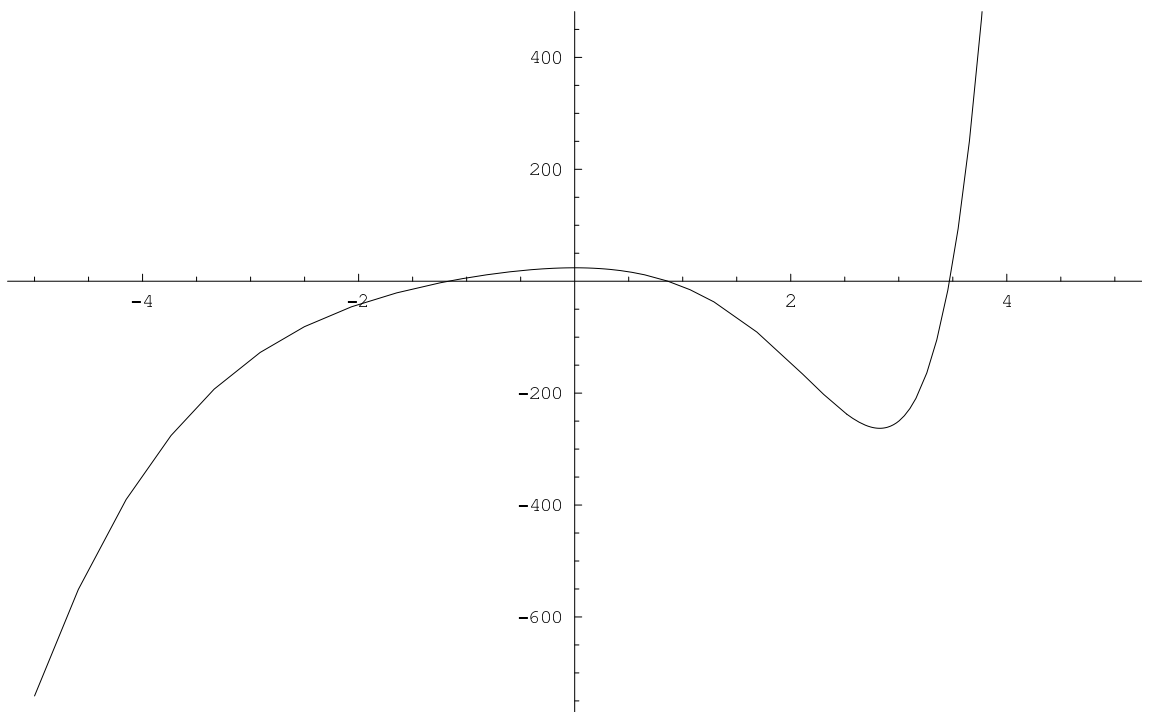
20. $f(x) = \frac{\sqrt{x^2 + x - 1} - x}{x}$



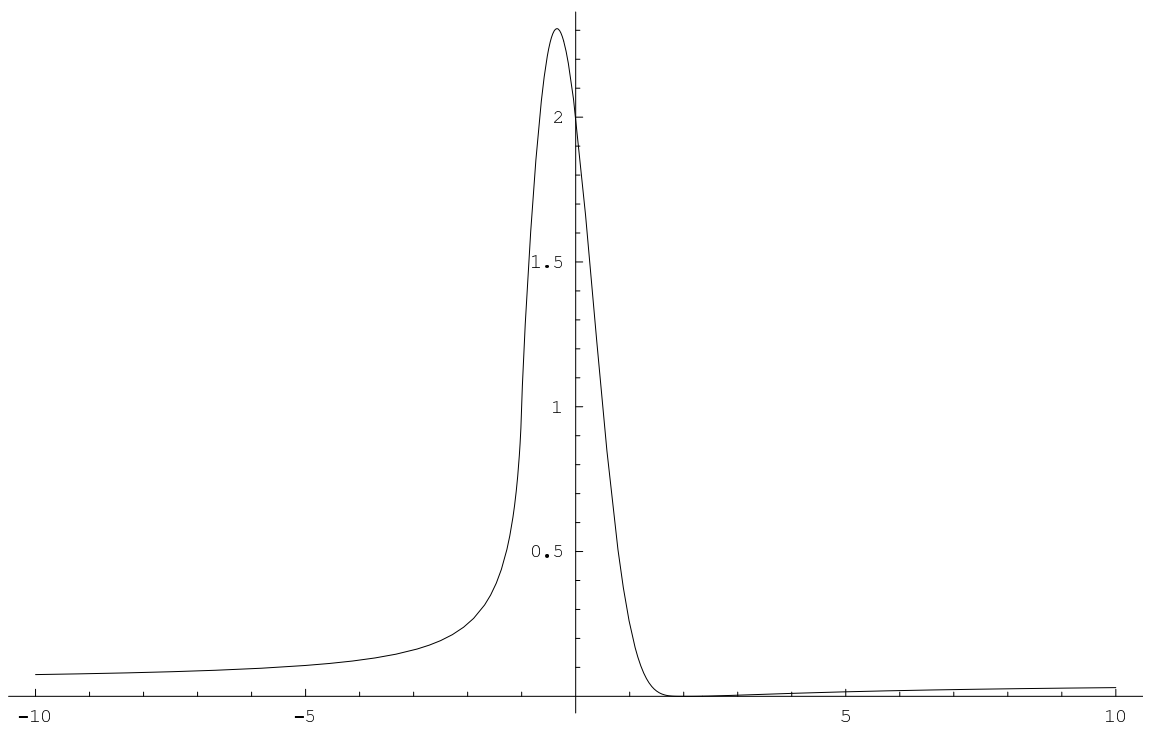
21. $f(x) = \arcsin(\sin(x))$



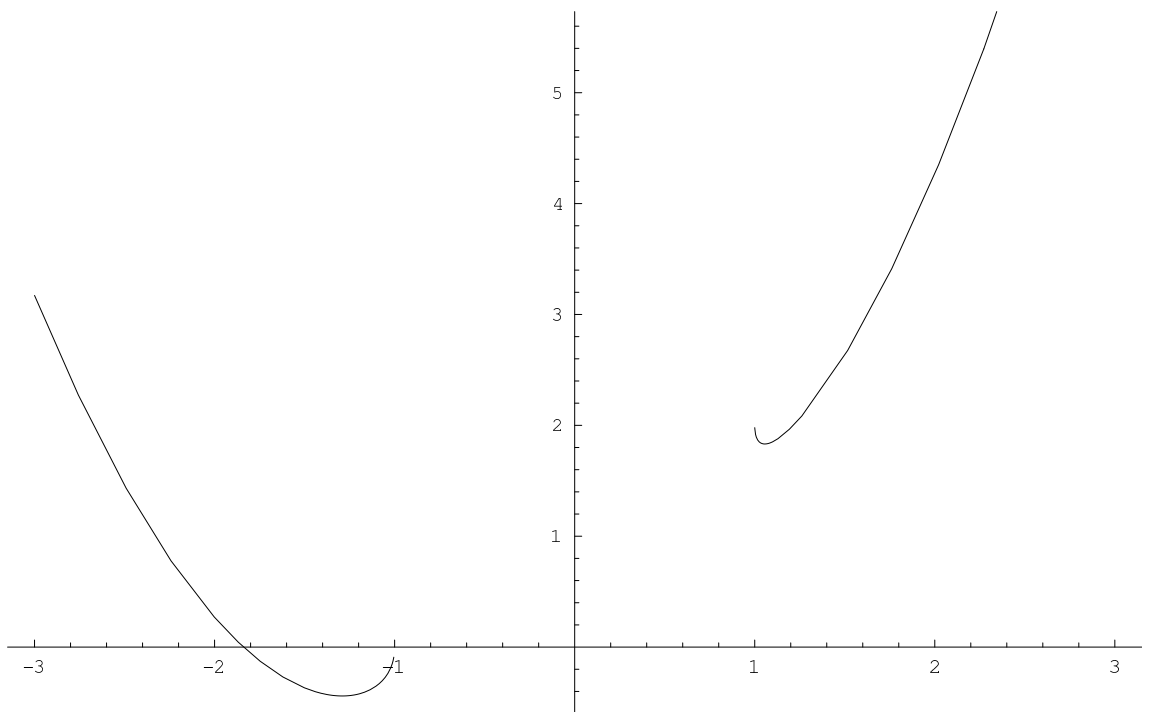
22. $f(x) = 12e^x(x^2 - 4x + 2) - x^4 + 24x$ (*)



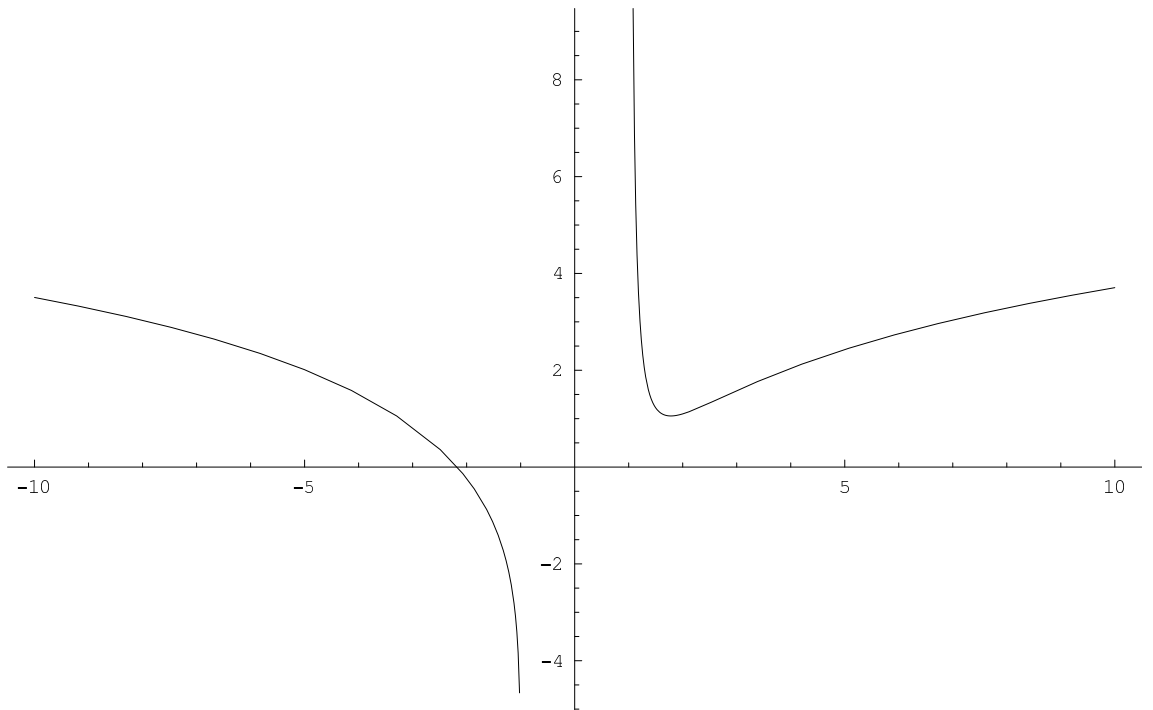
$$23. f(x) = \left| \frac{x-2}{x+1} \right|^{x+1} \quad (*)$$



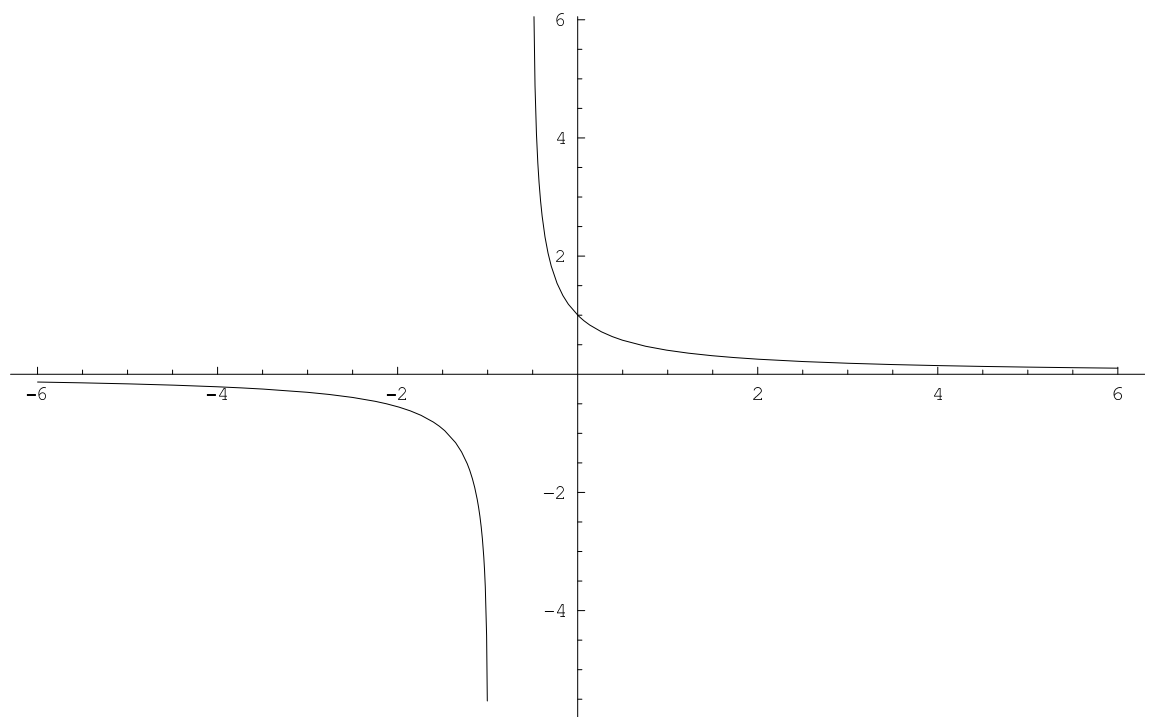
24. $f(x) = x^2 - x\sqrt{x^2 - 1}$



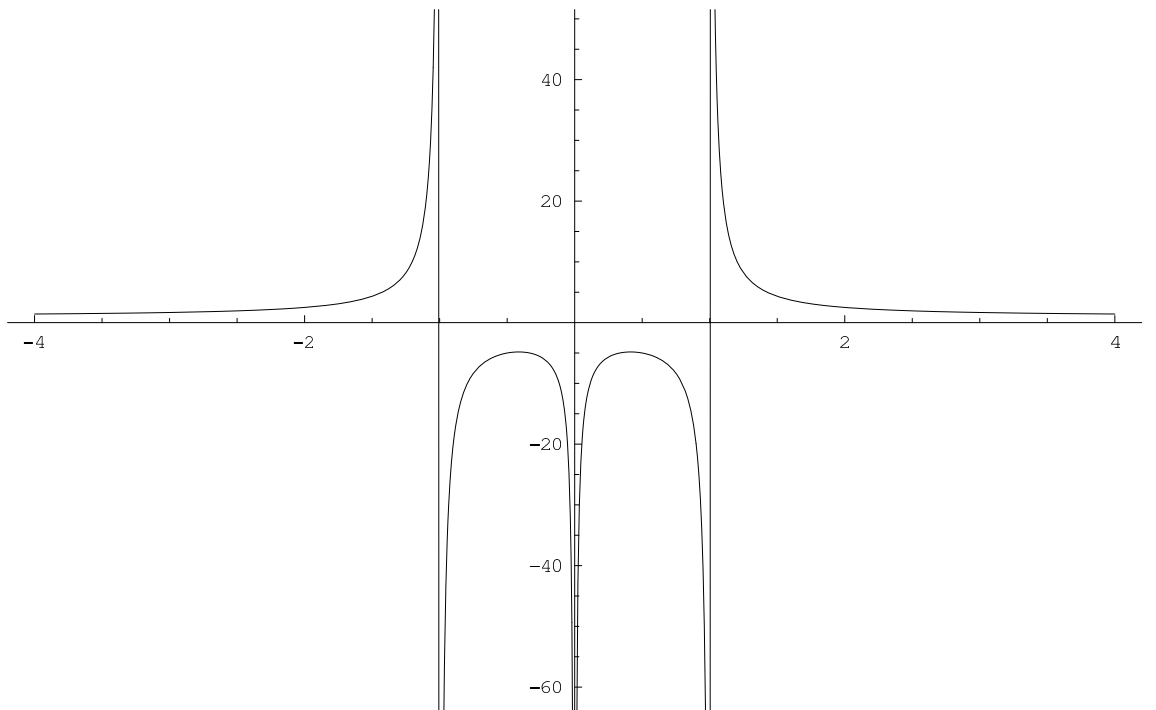
25. $f(x) = \ln(x^2 - 1) - \frac{x - 2}{x - 1}$ (*)



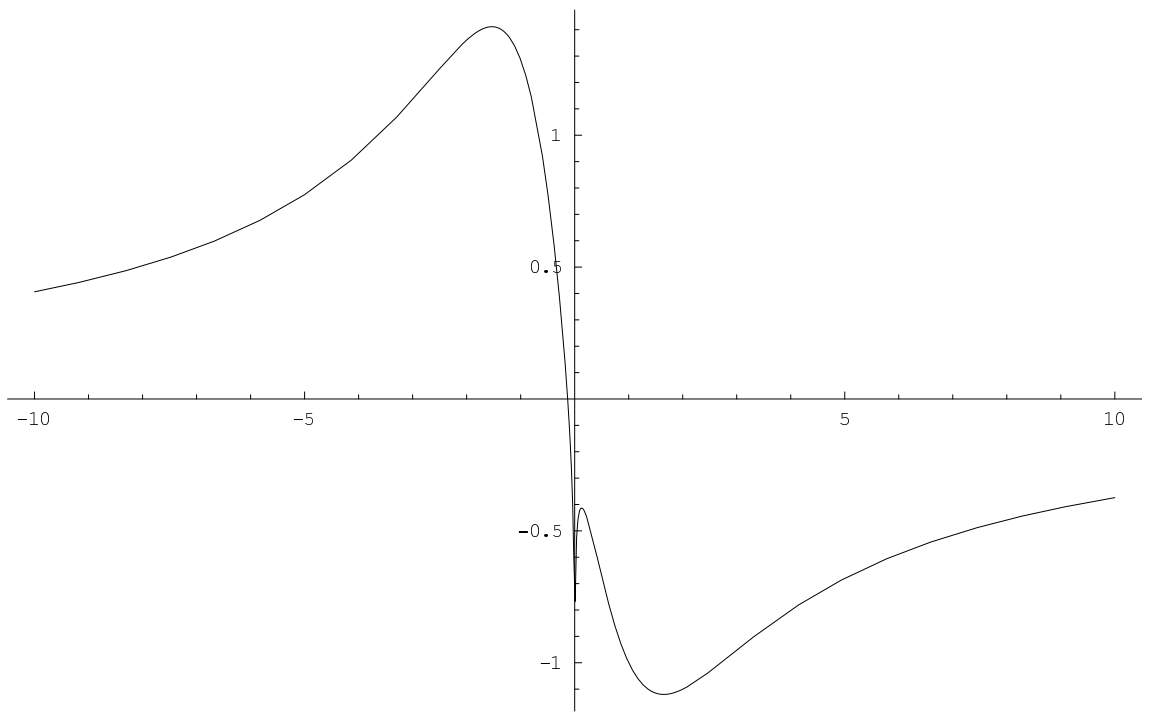
26. $f(x) = \frac{1}{x} \ln \left(\frac{2x+1}{x+1} \right)$

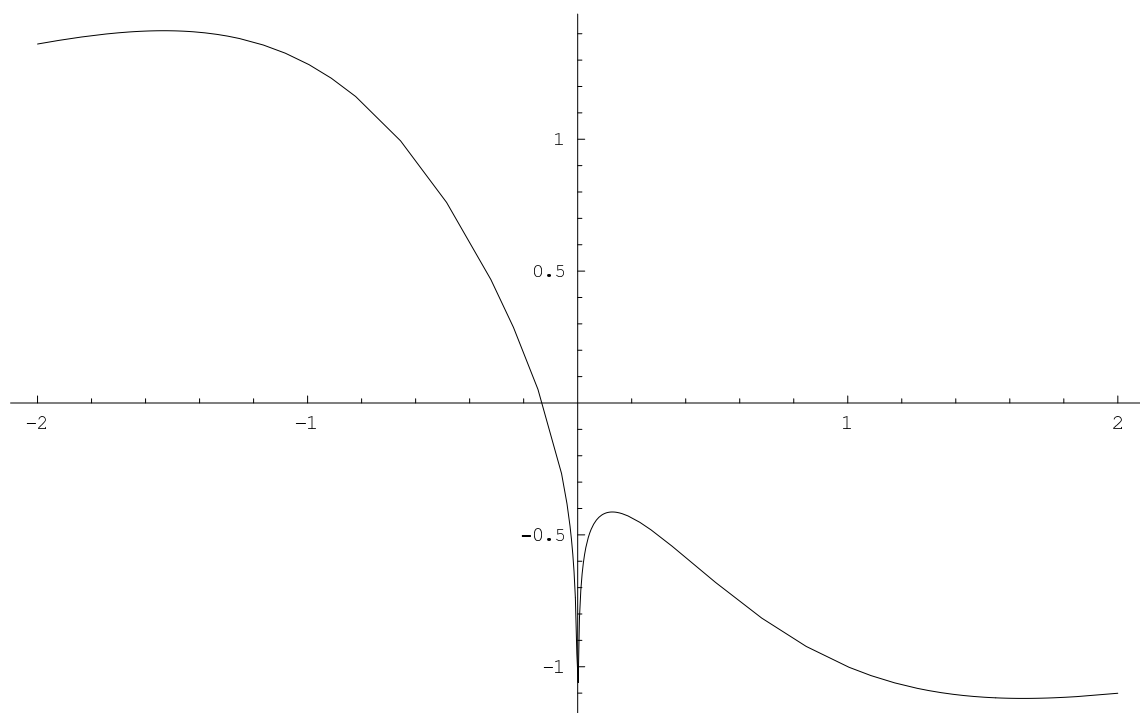


27. $f(x) = \frac{x^2 + 1}{x^2 - |x|}$

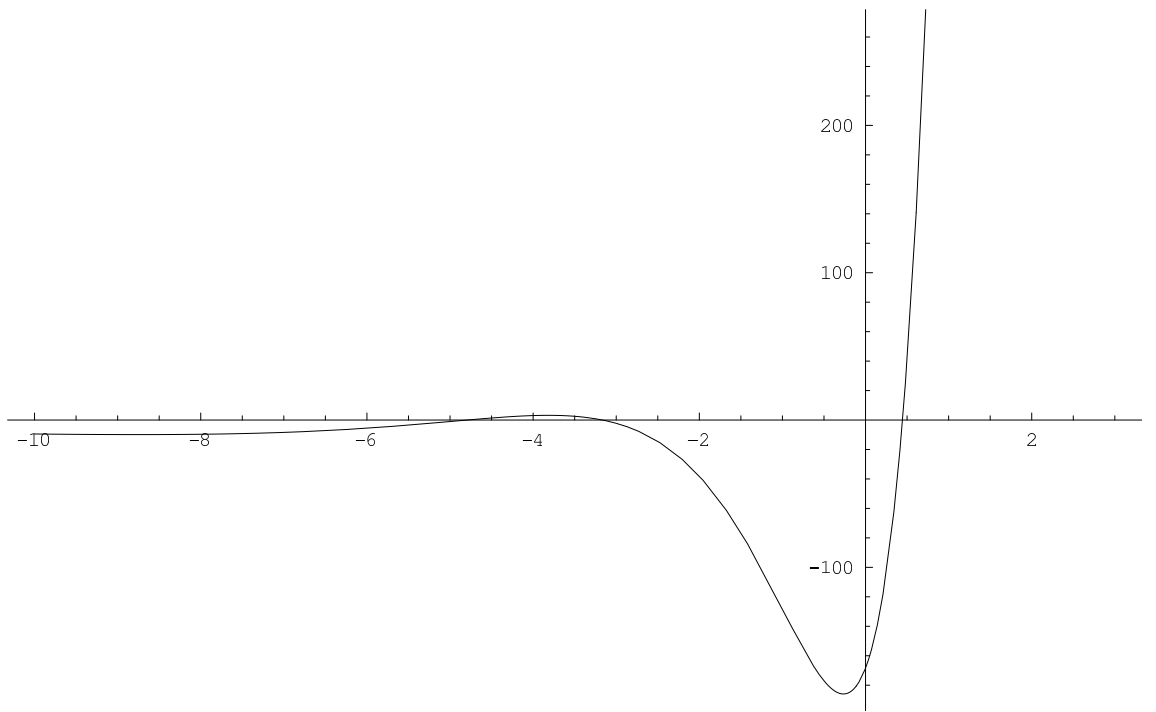


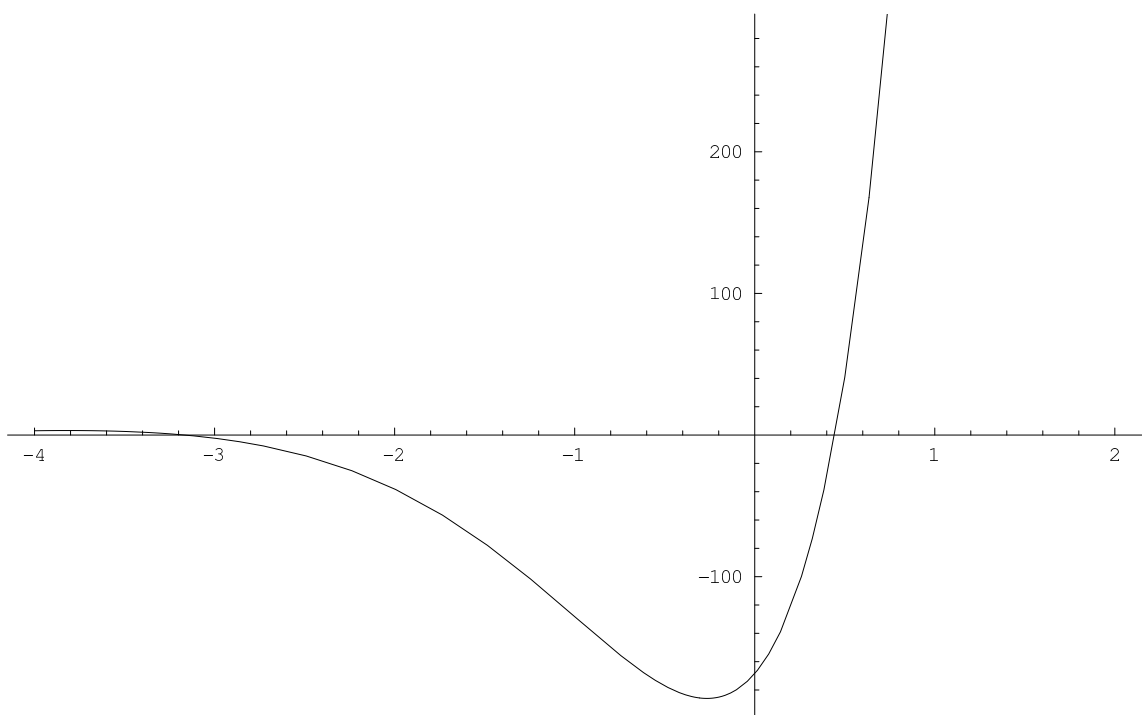
$$28. f(x) = \frac{1 + \ln|x| - 8x}{5 + 2x^2} \quad (*)$$

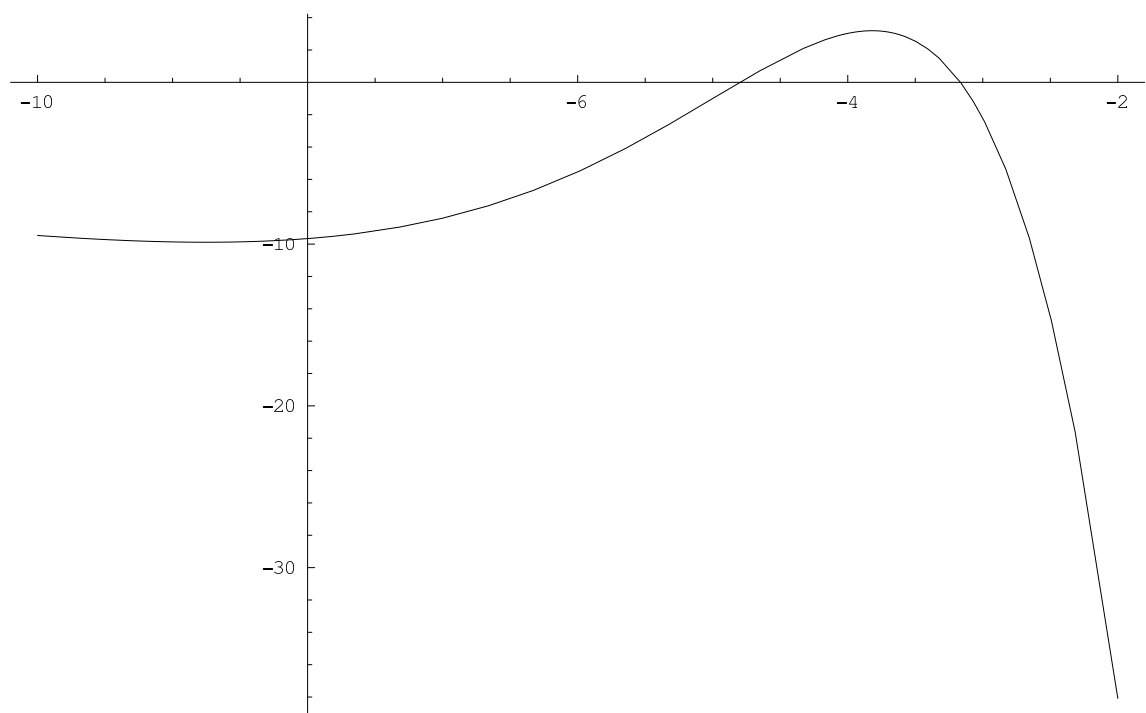




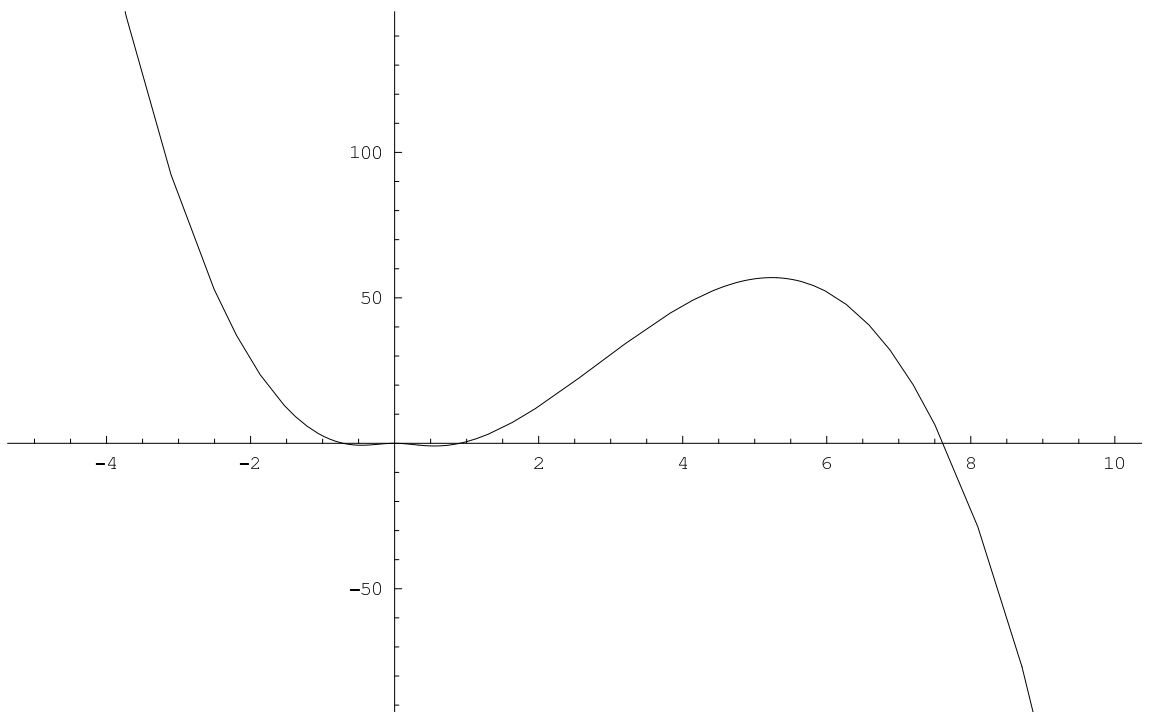
29. $f(x) = (x^2 + 2x - 1)e^{x+5} - x - 20$ (*)



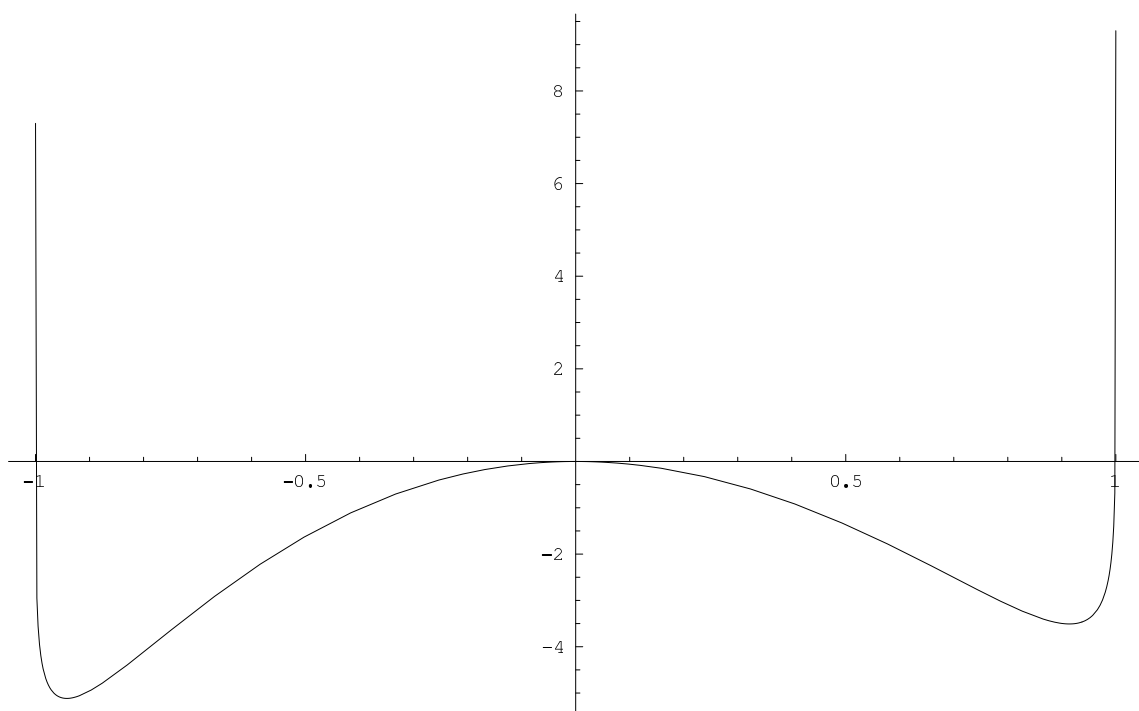




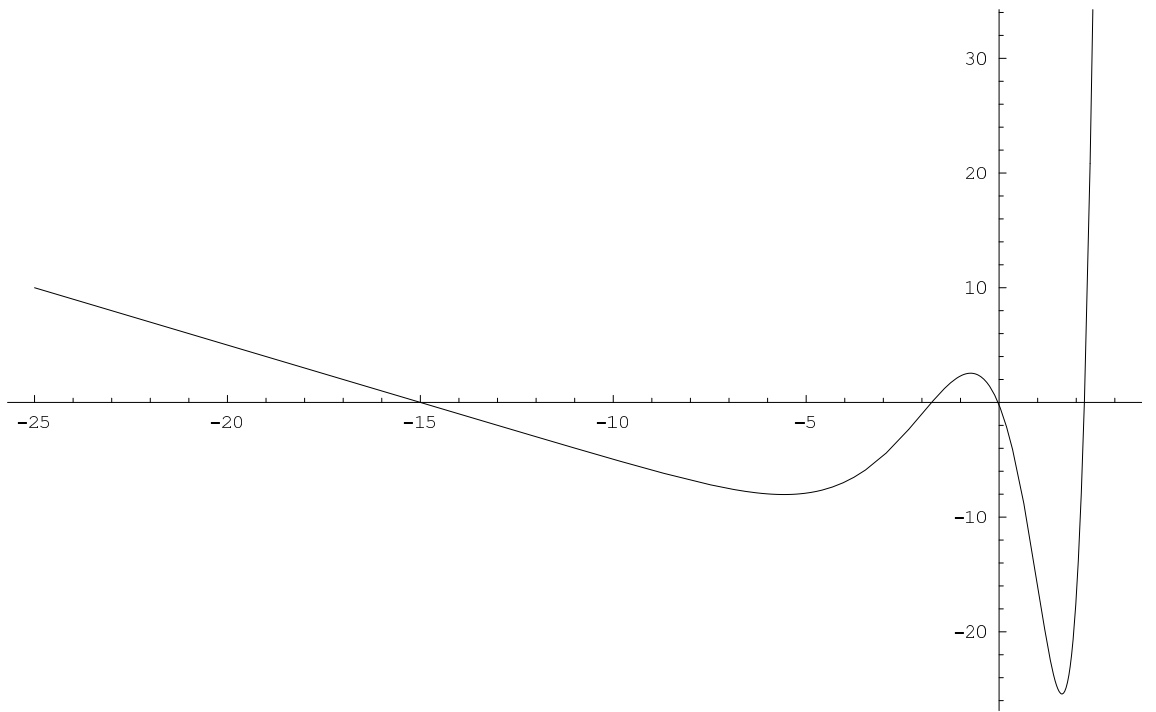
30. $f(x) = 8x^2 - x^3 - 4\ln(1 + 4x^2)$ (*)



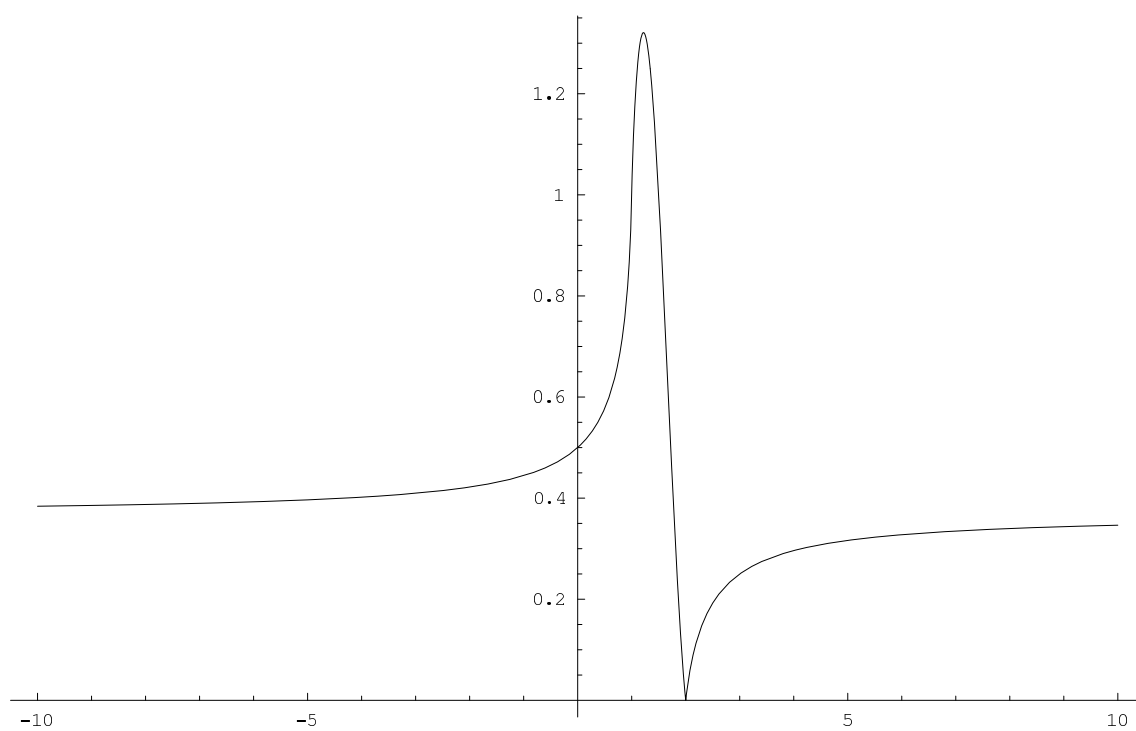
$$31. f(x) = \ln \left(\frac{1+x^2}{1-x^2} \right) - 8x^2 + x^3 \quad (*)$$



32. $f(x) = (x^2 - 3x + 2)e^{x+2} - x - 15$ (*)



$$33. f(x) = \left| \frac{x-2}{x-1} \right|^{x-1} \quad (*)$$



* = più difficile.

Alcune Soluzioni

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