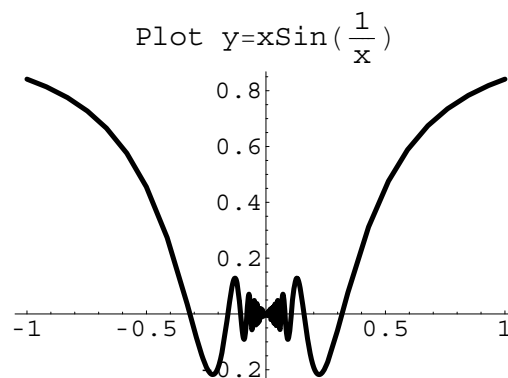
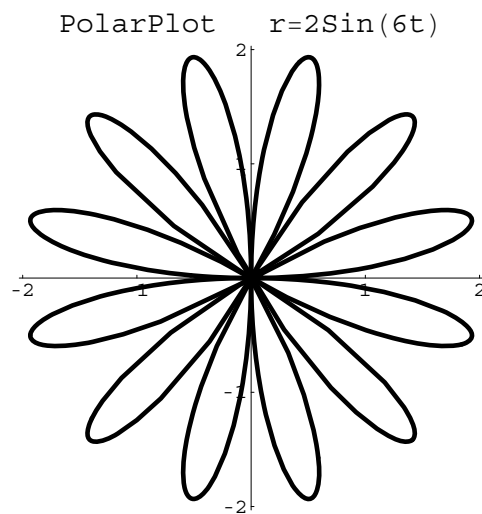


جزوه
ریاضیات عمومی

محمد هادی مصلحی^۱

۱۳۸۷



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$$\tan a = \frac{\sin 2a}{1 + \cos 2a} \quad (19)$$

$$\sin^2 a = \frac{1 - \cos 2a}{2} \quad (20)$$

$$\cos^2 a = \frac{1 + \cos 2a}{2} \quad (21)$$

$$\sin a \cos b = \frac{1}{2}[\sin(a+b) + \sin(a-b)] \quad (22)$$

$$\cos a \sin b = \frac{1}{2}[\sin(a+b) - \sin(a-b)] \quad (23)$$

$$\cos a \cos b = \frac{1}{2}[\cos(a+b) + \cos(a-b)] \quad (24)$$

$$\sin a \sin b = \frac{1}{2}[\cos(a-b) - \cos(a+b)] \quad (25)$$

$$\sin a + \sin b = 2 \sin\left(\frac{a+b}{2}\right) \cos\left(\frac{a-b}{2}\right) \quad (26)$$

$$\sin a - \sin b = 2 \cos\left(\frac{a+b}{2}\right) \sin\left(\frac{a-b}{2}\right) \quad (27)$$

$$\cos a + \cos b = 2 \cos\left(\frac{a+b}{2}\right) \cos\left(\frac{a-b}{2}\right) \quad (28)$$

$$\cos a - \cos b = -2 \sin\left(\frac{a+b}{2}\right) \sin\left(\frac{a-b}{2}\right) \quad (29)$$

$$\tan a + \tan b = \frac{\sin(a+b)}{\cos a \cos b} \quad (30)$$

$$\tan a - \tan b = \frac{\sin(a-b)}{\cos a \cos b} \quad (31)$$

$$\cot a + \cot b = \frac{\sin(a+b)}{\sin a \sin b} \quad (32)$$

$$\cot a - \cot b = \frac{\sin(b-a)}{\sin a \sin b} \quad (33)$$

$$\sin 2a = 2 \sin a - 4 \sin^3 a \quad (34)$$

$$\cos 2a = 4 \cos^3 a - 3 \cos a \quad (35)$$

$$\tan 2a = \frac{2 \tan a - \tan^3 a}{1 - 3 \tan^2 a} \quad (36)$$

فرمولهای توابع مثلثاتی

$$\sin^2 x + \cos^2 x = 1 \quad (1)$$

$$\tan x = \frac{\sin x}{\cos x} \quad (2)$$

$$\cot x = \frac{\cos x}{\sin x} \quad (3)$$

$$\sec x = \frac{1}{\cos x} \quad (4)$$

$$\csc x = \frac{1}{\sin x} \quad (5)$$

$$\tan x \cot x = 1 \quad (6)$$

$$\sin(a \mp b) = \sin a \cos b \mp \cos a \sin b \quad (7)$$

$$\cos(a \mp b) = \cos a \cos b \pm \sin a \sin b \quad (8)$$

$$\tan(a \mp b) = \frac{\tan a \mp \tan b}{1 \pm \tan a \tan b} \quad (9)$$

$$\cot(a \mp b) = \frac{\cot a \cot b \pm 1}{\cot b \mp \cot a} \quad (10)$$

$$\sin 2a = 2 \sin a \cos a \quad (11)$$

$$\sin 2a = \frac{2 \tan a}{1 + \tan^2 a} \quad (12)$$

$$\cos 2a = \cos^2 a - \sin^2 a \quad (13)$$

$$\cos 2a = 1 - 2 \sin^2 a \quad (14)$$

$$\cos 2a = 2 \cos^2 a - 1 \quad (15)$$

$$\cos 2a = \frac{1 - \tan^2 a}{1 + \tan^2 a} \quad (16)$$

$$\tan 2a = \frac{2 \tan a}{1 - \tan^2 a} \quad (17)$$

$$\cot 2a = \frac{\cot^2 a - 1}{2 \cot a} \quad (18)$$

فرمولهای توابع هذلولوی

$$\sinh^{\gamma} a = \frac{\cosh^{\gamma} a - 1}{\gamma} \quad (55)$$

$$\cosh^{\gamma} a = \frac{\cosh^{\gamma} a + 1}{\gamma} \quad (56)$$

$$\sinh a \cosh b = \frac{1}{\gamma} [\sinh(a+b) + \sinh(a-b)] \quad (57)$$

$$\cosh a \sinh b = \frac{1}{\gamma} [\sinh(a+b) - \sinh(a-b)] \quad (58)$$

$$\cosh a \cosh b = \frac{1}{\gamma} [\cosh(a+b) + \cosh(a-b)] \quad (59)$$

$$\sinh a \sinh b = \frac{1}{\gamma} [\cosh(a+b) - \cosh(a-b)] \quad (60)$$

$$\sinh^{\gamma} a = \gamma \sinh a + \gamma \sinh^{\gamma} a \quad (61)$$

$$\cosh^{\gamma} a = \gamma \cosh^{\gamma} a - \gamma \cosh a \quad (62)$$

فرمولهای لگاریتمی برای محاسبه توابع هذلولوی معکوس

$$\sinh^{-1} x = \ln(x + \sqrt{x^{\gamma} + 1}) \quad -\infty < x < \infty \quad (63)$$

$$\cosh^{-1} x = \ln(x + \sqrt{x^{\gamma} - 1}) \quad x \geq 1 \quad (64)$$

$$\tanh^{-1} x = \frac{1}{\gamma} \ln\left(\frac{1+x}{1-x}\right) \quad |x| < 1 \quad (65)$$

$$\coth^{-1} x = \frac{1}{\gamma} \ln\left(\frac{x+1}{x-1}\right) \quad |x| > 1 \quad (66)$$

$$\operatorname{sech}^{-1} x = \ln\left(\frac{1 + \sqrt{1-x^{\gamma}}}{x}\right) \quad 0 < x \leq 1 \quad (67)$$

$$\operatorname{csch}^{-1} x = \ln\left(\frac{1}{x} + \frac{\sqrt{1+x^{\gamma}}}{|x|}\right) \quad x \neq 0 \quad (68)$$

$$\operatorname{sech}^{-1} x = \cosh^{-1}\left(\frac{1}{x}\right) \quad (69)$$

$$\operatorname{csch}^{-1} x = \sinh^{-1}\left(\frac{1}{x}\right) \quad (70)$$

$$\coth^{-1} x = \tanh^{-1}\left(\frac{1}{x}\right) \quad (71)$$

$$\sinh x = \frac{e^x - e^{-x}}{\gamma} \quad (37)$$

$$\cosh x = \frac{e^x + e^{-x}}{\gamma} \quad (38)$$

$$\cosh^{\gamma} x - \sinh^{\gamma} x = 1 \quad (39)$$

$$\sinh x + \cosh x = e^x \quad (40)$$

$$\cosh x - \sinh x = e^{-x} \quad (41)$$

$$\cosh(-x) = \cosh x \quad (42)$$

$$\sinh(-x) = -\sinh x \quad (43)$$

$$\sinh^{\gamma} x - \sinh^{\gamma} y = \cosh^{\gamma} x - \cosh^{\gamma} y \quad (44)$$

$$(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx) \quad (45)$$

$$\sinh x \leq \cosh x \quad (46)$$

$$\cosh x \approx \sinh x \quad \text{برای } x \text{ های بزرگ} \quad (47)$$

$$\forall x \in R - \{0\}; \quad x \sinh x > 0. \quad (48)$$

$$\sinh(a \mp b) = \sinh a \cosh b \mp \cosh a \sinh b \quad (49)$$

$$\cosh(a \mp b) = \cosh a \cosh b \mp \sinh a \sinh b \quad (50)$$

$$\sinh^{\gamma} a = \gamma \sinh a \cosh a \quad (51)$$

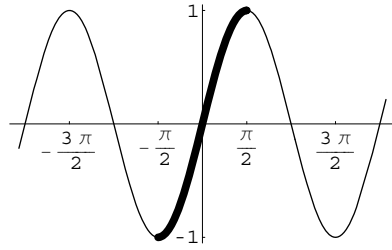
$$\cosh^{\gamma} a = \cosh^{\gamma} a + \sinh^{\gamma} a \quad (52)$$

$$\cosh^{\gamma} a = \gamma \sinh^{\gamma} a + 1 \quad (53)$$

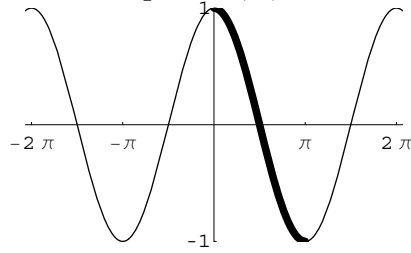
$$\cosh^{\gamma} a = \gamma \cosh^{\gamma} a - 1 \quad (54)$$

نمودار توابع مثلثاتی

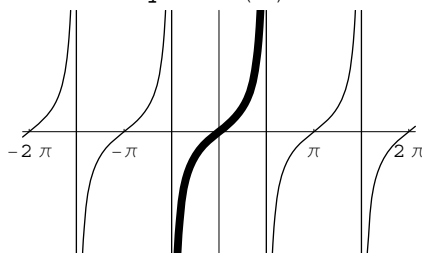
$y = \sin(x)$



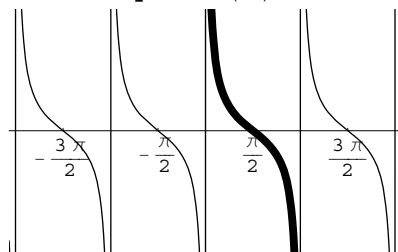
$y = \cos(x)$



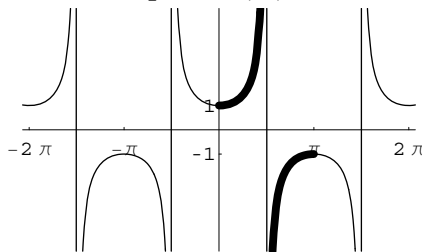
$y = \tan(x)$



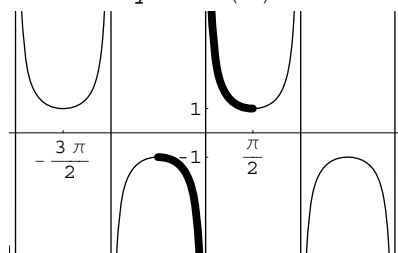
$y = \cot(x)$



$y = \sec(x)$

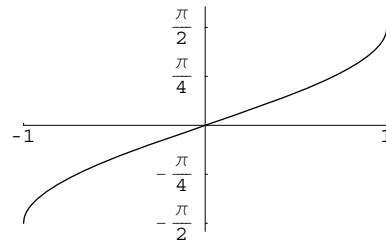


$y = \csc(x)$

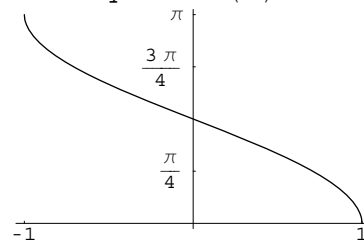


نمودار توابع مثلثاتی معکوس

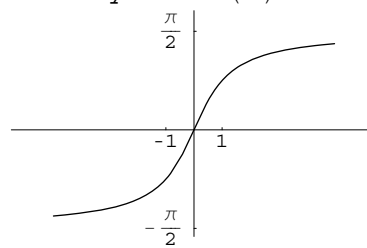
$y = \sin^{-1}(x)$



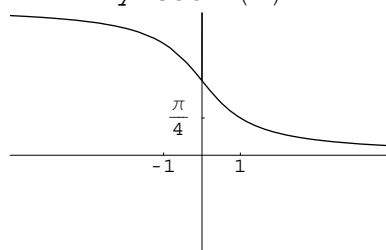
$y = \cos^{-1}(x)$



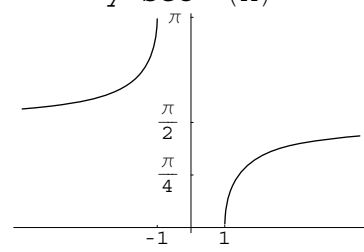
$y = \tan^{-1}(x)$



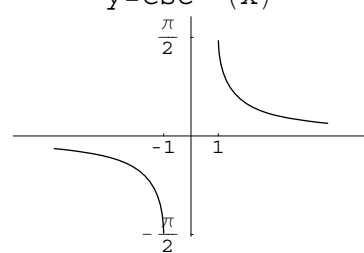
$y = \cot^{-1}(x)$



$y = \sec^{-1}(x)$

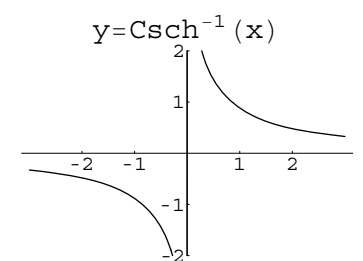
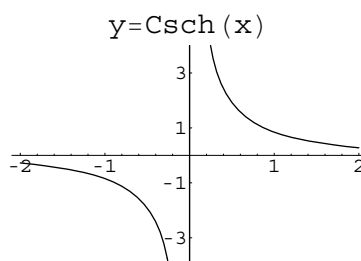
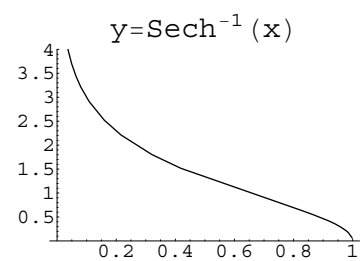
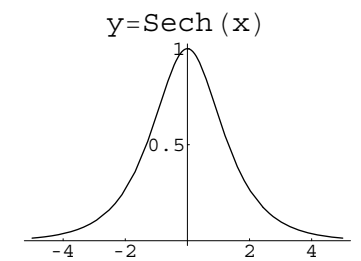
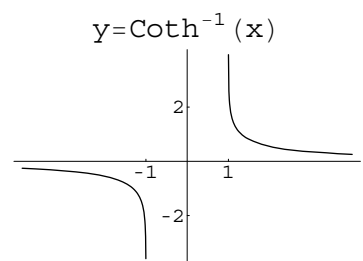
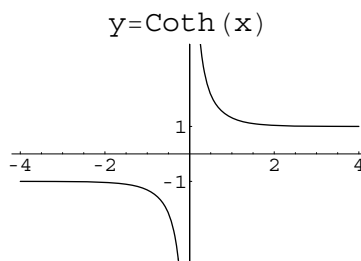
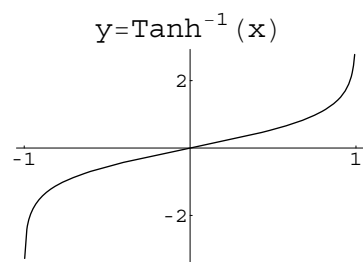
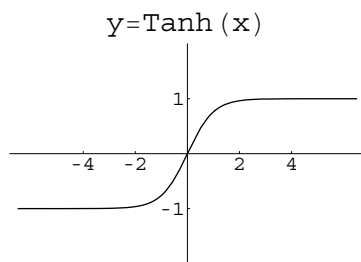
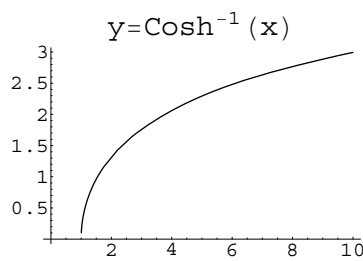
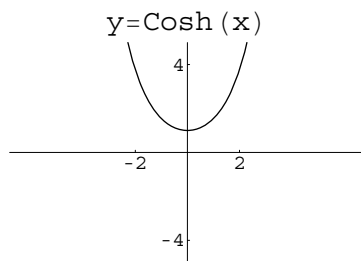
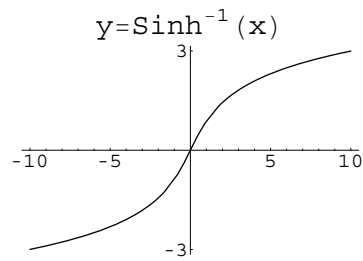
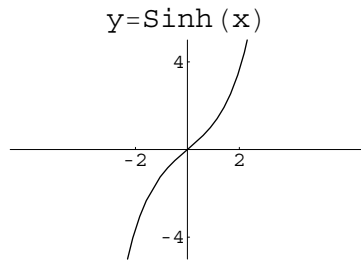


$y = \csc^{-1}(x)$



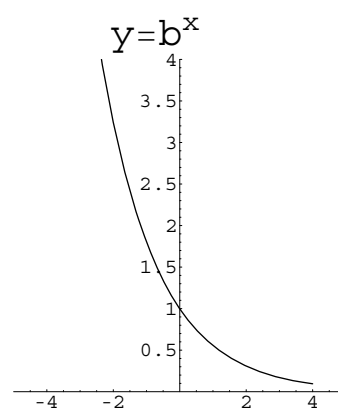
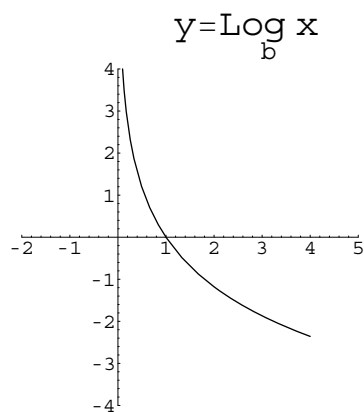
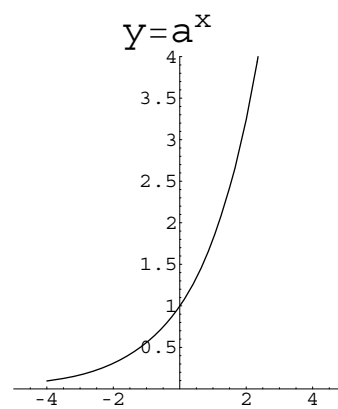
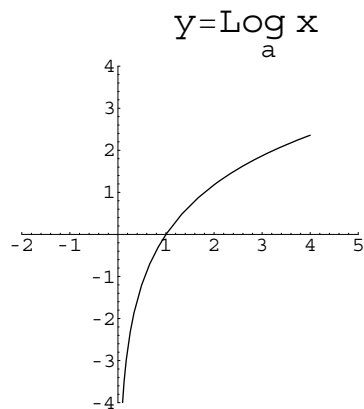
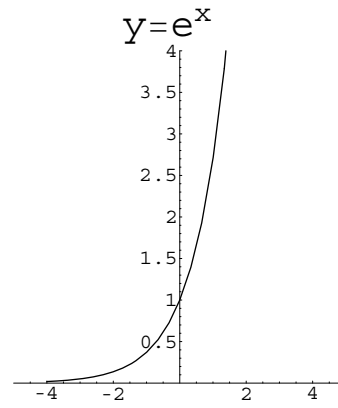
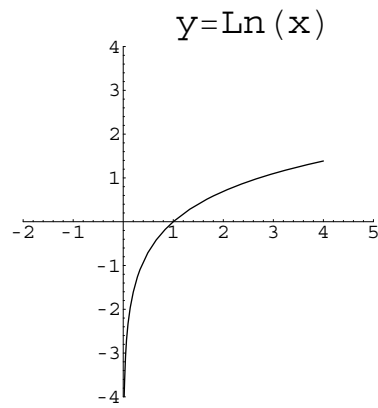
نمودار توابع هذلولوی

نمودار توابع هذلولوی معکوس



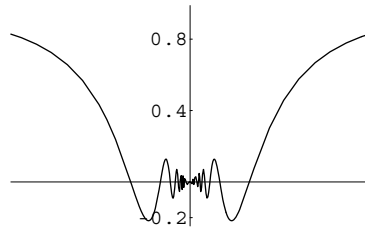
نمودار توابع نمایی و لگاریتمی

$$a=1.8 \quad , \quad b=1/a$$

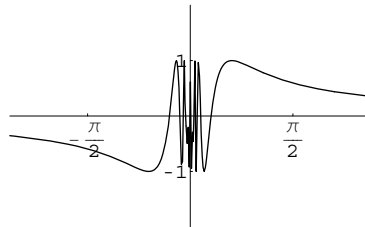


رسم چند تابع مهم :

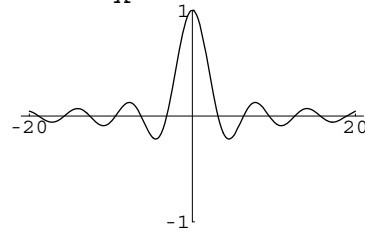
$$y = x \sin\left(\frac{1}{x}\right)$$



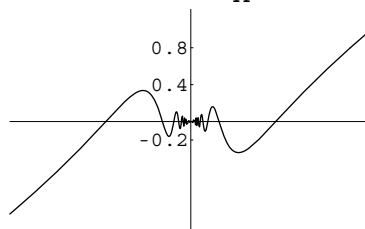
$$y = \sin\left(\frac{1}{x}\right)$$



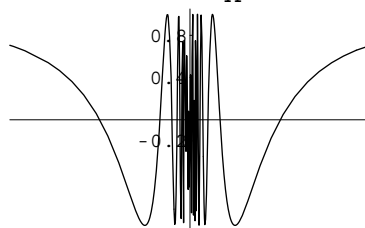
$$y = \frac{\sin(x)}{x}$$



$$y = x \cos\left(\frac{1}{x}\right)$$

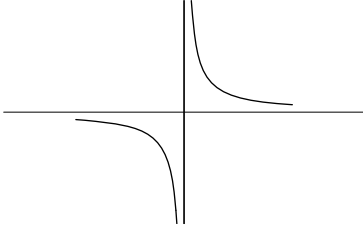


$$y = \cos\left(\frac{1}{x}\right)$$

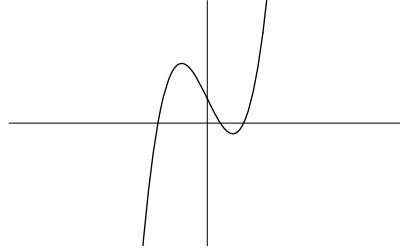


رسم چند تابع داخواه :

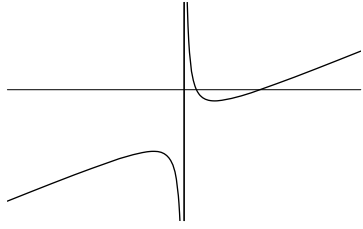
$$y = \frac{1}{x}$$



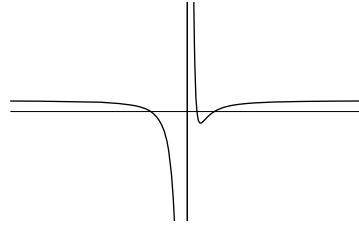
$$y = x^3 - 5x + 3$$



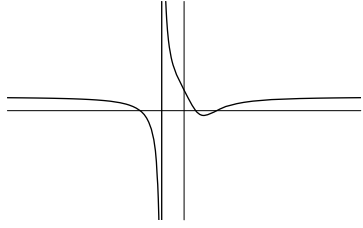
$$y = \frac{x^2 - 5x + 3}{x}$$



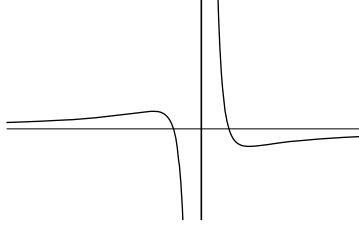
$$y = \frac{x^3 - 5x + 3}{x^3}$$



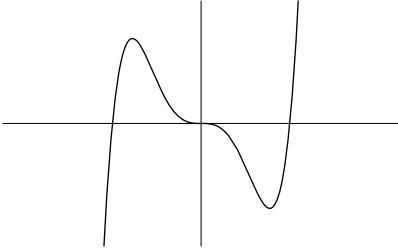
$$y = \frac{x^3 - 5x + 3}{x^3 + 2}$$



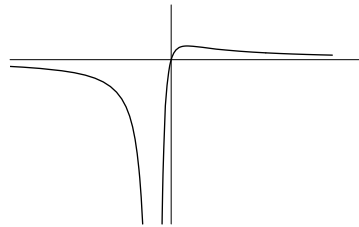
$$y = \frac{1}{x^3} - \frac{1}{x}$$



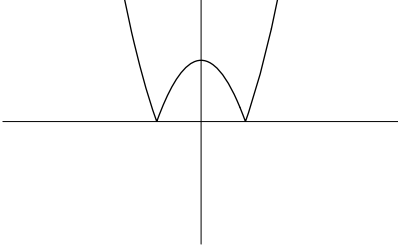
$$y = x^5 - 5x^3$$



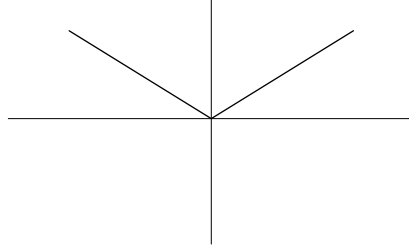
$$y = \frac{x}{(x+1)^2}$$



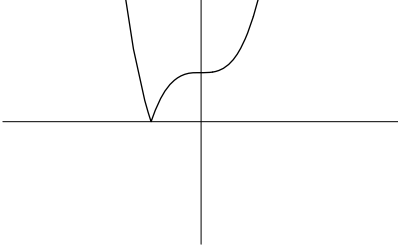
$$y = |x^2 - 5|$$



$$y = |x|$$



$$y = |x^3 + 2|$$



$$y = |x^2 - 5|$$

