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Lab 7

Problem1:

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with(plots)
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[animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d, conformal,
    conformal3d, contourplot, contourplot3d, coordplot, coordplot3d, densityplot, display,
    dualaxisplot, fieldplot, fieldplot3d, gradplot, gradplot3d, implicitplot, implicitplot3d, inequal,
    interactive, interactiveparams, intersectplot, listcontplot, listcontplot3d, listdensityplot, listplot,
    listplot3d, loglogplot, logplot, matrixplot, multiple, odeplot, pareto, plotcompare, pointplot,
    pointplot3d, polarplot, polygonplot, polygonplot3d, polyhedra_supported, polyhedraplot,
    rootlocus, semilogplot, setcolors, setoptions, setoptions3d, shadebetween, spacecurve,
    sparsematrixplot, surfdata, textplot, textplot3d, tubeplot]
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(1)

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implicitplot(y^2 + 4*x*y + 2*x^3 = 7, x = -5..5, y = -8..8);
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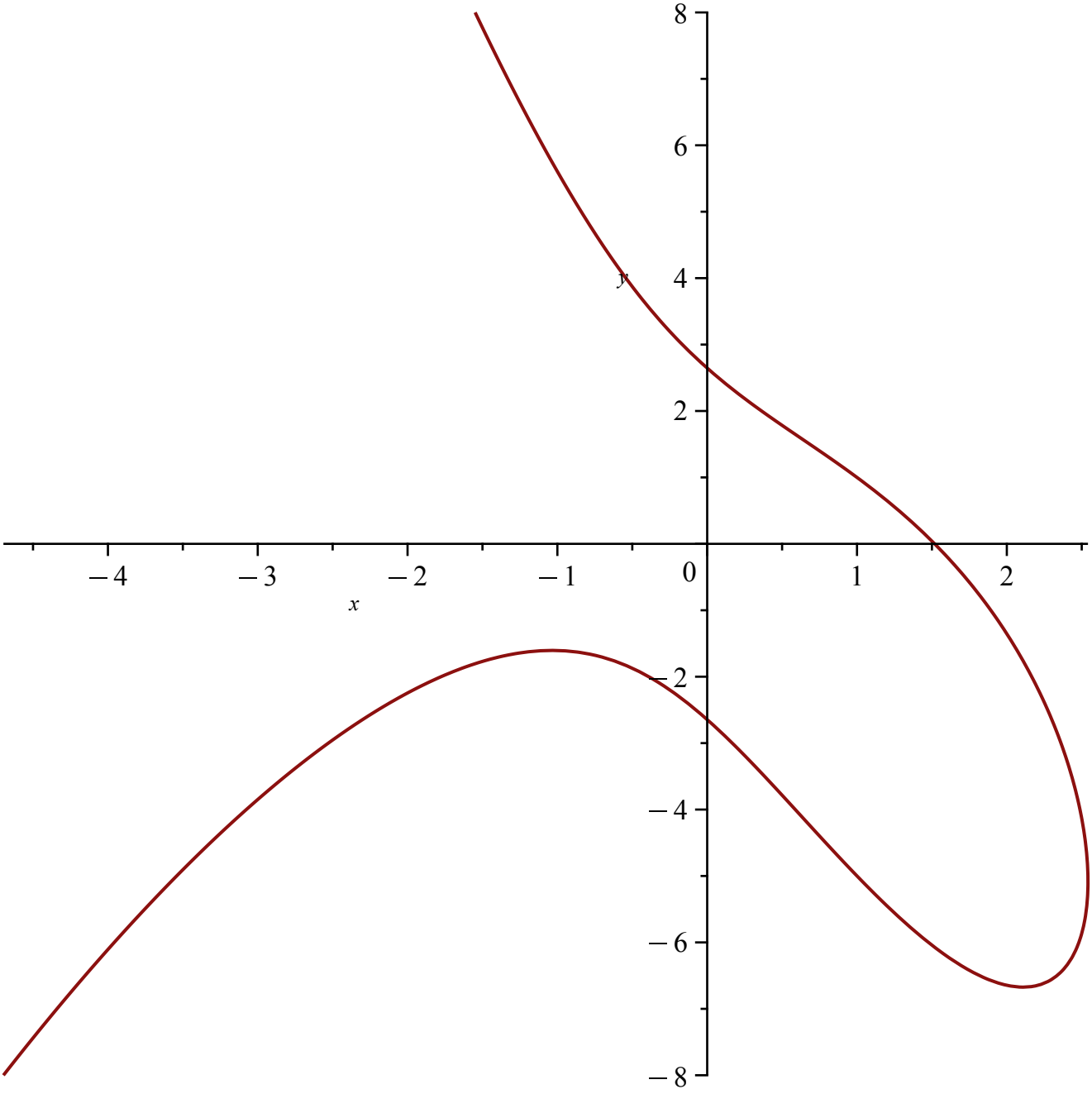


$subs\left(x=1, y=1, y^2+4\cdot x\cdot y+2\cdot x^3\right);$

$$7 \tag{2}$$

$implicitdiff\left(y^2+4\cdot x\cdot y+2\cdot x^3=7, y, x\right);$

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

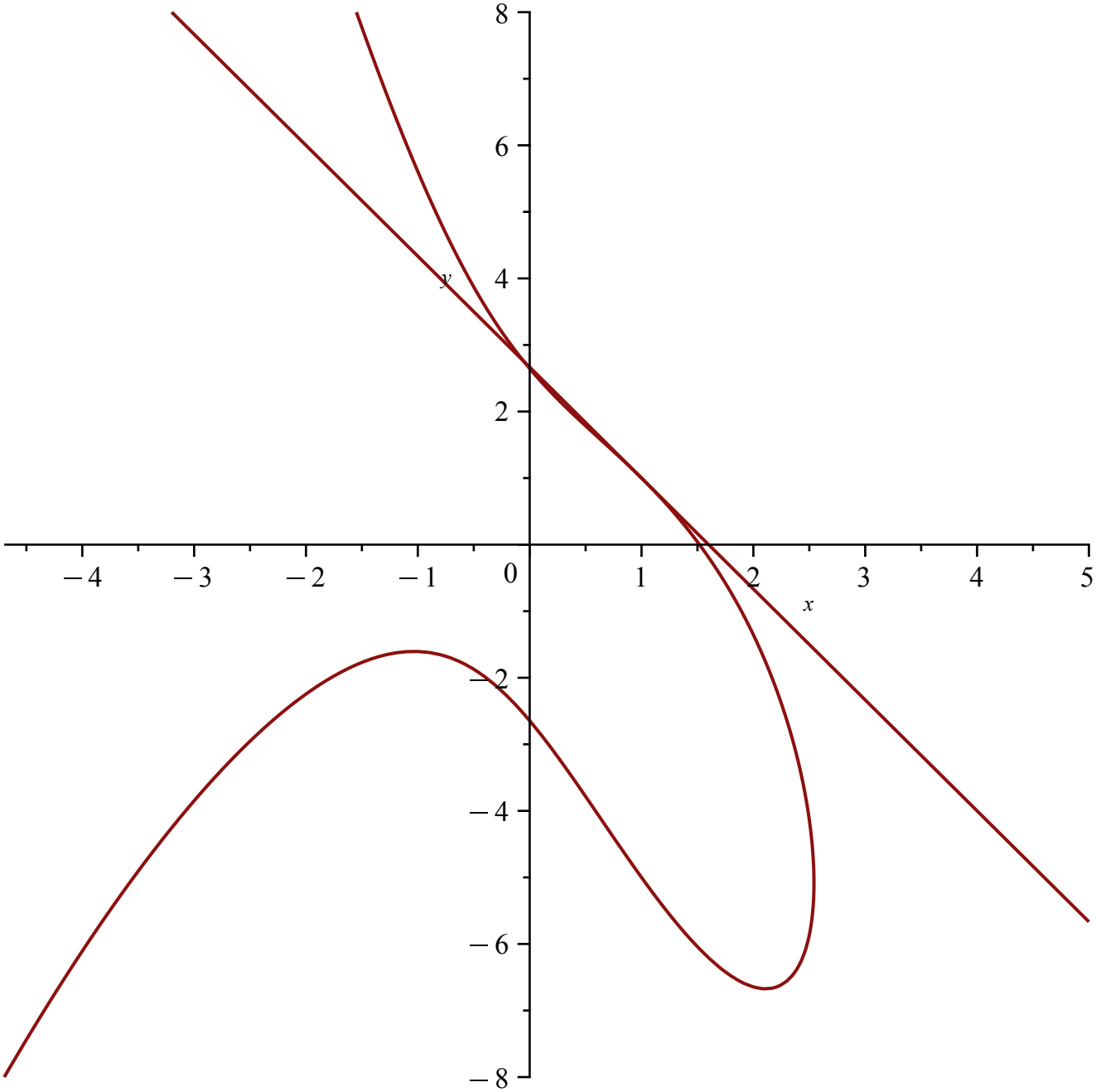
$$m := subs\left(x=1, y=1, -\frac{3x^2+2y}{2x+y}\right);$$

$$m := -\frac{5}{3} \tag{4}$$

$TangentLine := y = m \cdot (x - 1) + 1;$

$$TangentLine := y = -\frac{5\,x}{3} + \frac{8}{3} \tag{5}$$

$implicitplot(\{y^2 + 4 \cdot x \cdot y + 2 \cdot x^3 = 7, TangentLine\}, x = -5..5, y = -8..8);$



Problem 2:

$$subs\left(x=4, y=2, 3\cdot\left(x^2+y^2\right)^2=100\cdot\left(x^2-y^2\right)\right);$$

$$1200 = 1200 \quad \textbf{(6)}$$

$$implicitdiff\left(3\cdot\left(x^2+y^2\right)^2=100\cdot\left(x^2-y^2\right), y, x\right);$$

$$-\frac{x\left(3x^2+3y^2-50\right)}{y\left(3x^2+3y^2+50\right)} \quad \textbf{(7)}$$

$$m := subs\left(x=4, y=2, -\frac{x\left(3x^2+3y^2-50\right)}{y\left(3x^2+3y^2+50\right)}\right);$$

$$m := -\frac{2}{11} \quad \textbf{(8)}$$

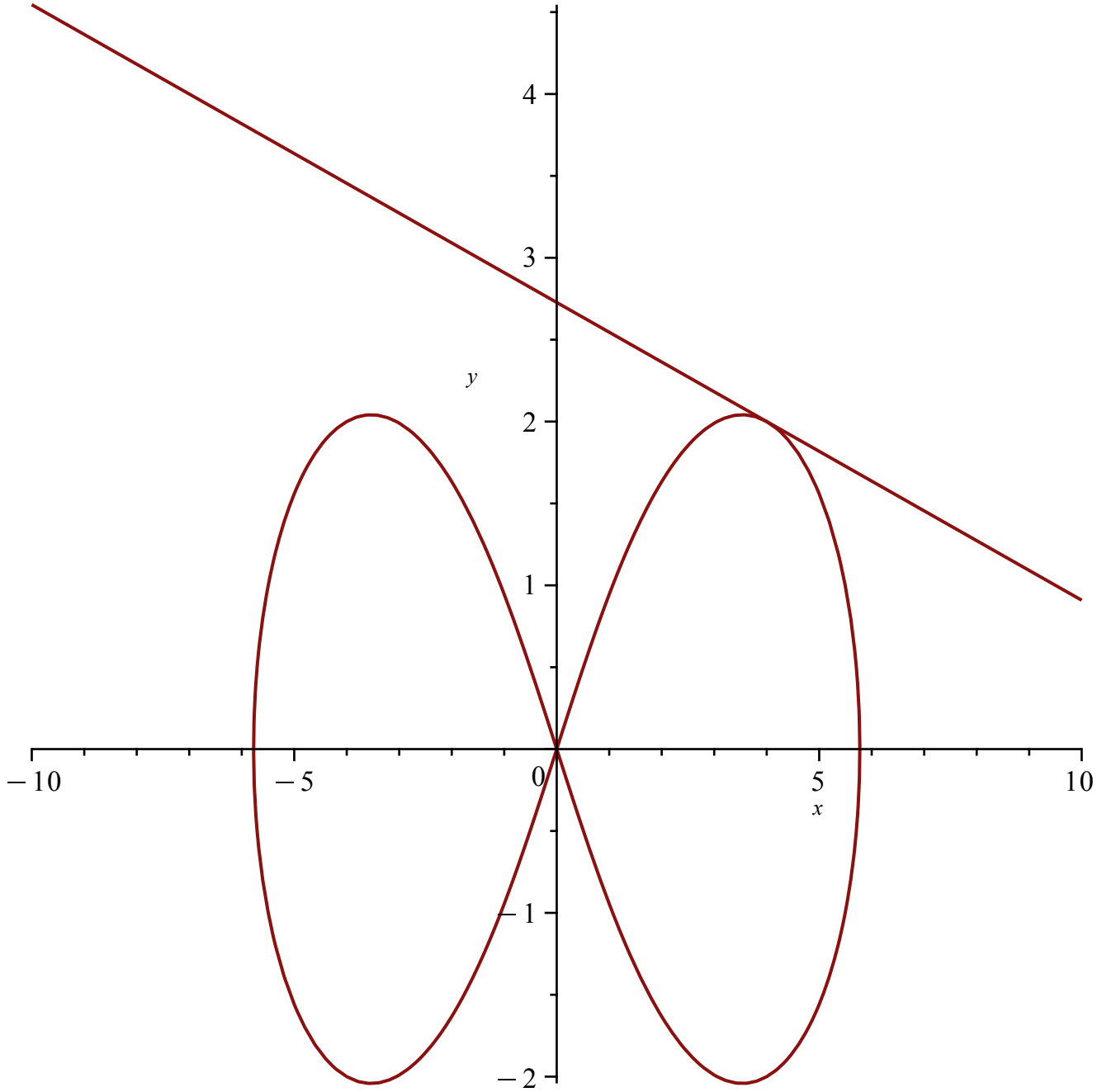
$$TangentLine := y = m\cdot(x-4)+2;$$

$$TangentLine := y = -\frac{2x}{11}+\frac{30}{11} \quad \textbf{(9)}$$

$$with(plots)$$

[*animate*, *animate3d*, *animatecurve*, *arrow*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *conformal3d*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *densityplot*, *display*, *dualaxisplot*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *implicitplot*, *implicitplot3d*, *inequal*, *interactive*, *interactiveparams*, *intersectplot*, *listcontplot*, *listcontplot3d*, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *multiple*, *odeplot*, *pareto*, *plotcompare*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *rootlocus*, *semilogplot*, *setcolors*, *setoptions*, *setoptions3d*, *shadebetween*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*] **(10)**

$$implicitplot\left(\left\{3\cdot\left(x^2+y^2\right)^2=100\cdot\left(x^2-y^2\right), TangentLine\right\}, x=-10..10, y=-10..10\right);$$



Problem 3:

$$subs\left(x = \text{sqrt}(3),\ y = 1,\ 7\cdot x^2 - 6\cdot\text{sqrt}(3)\cdot x\cdot y + 13\cdot y^2 - 16\right);$$

$$0 \qquad \textbf{(11)}$$

$$implicitdiff\left(7\cdot x^2 - 6\cdot\text{sqrt}(3)\cdot x\cdot y + 13\cdot y^2 - 16 = 0,\ y,\ x\right);$$

$$-\frac{3\sqrt{3}\,y - 7\,x}{3\sqrt{3}\,x - 13\,y} \qquad \textbf{(12)}$$

$$m := subs\left(x = \text{sqrt}(3),\ y = 1,\ -\frac{3\sqrt{3}\,y - 7\,x}{3\sqrt{3}\,x - 13\,y}\right);$$

$$m := -\sqrt{3} \quad \textbf{(13)}$$

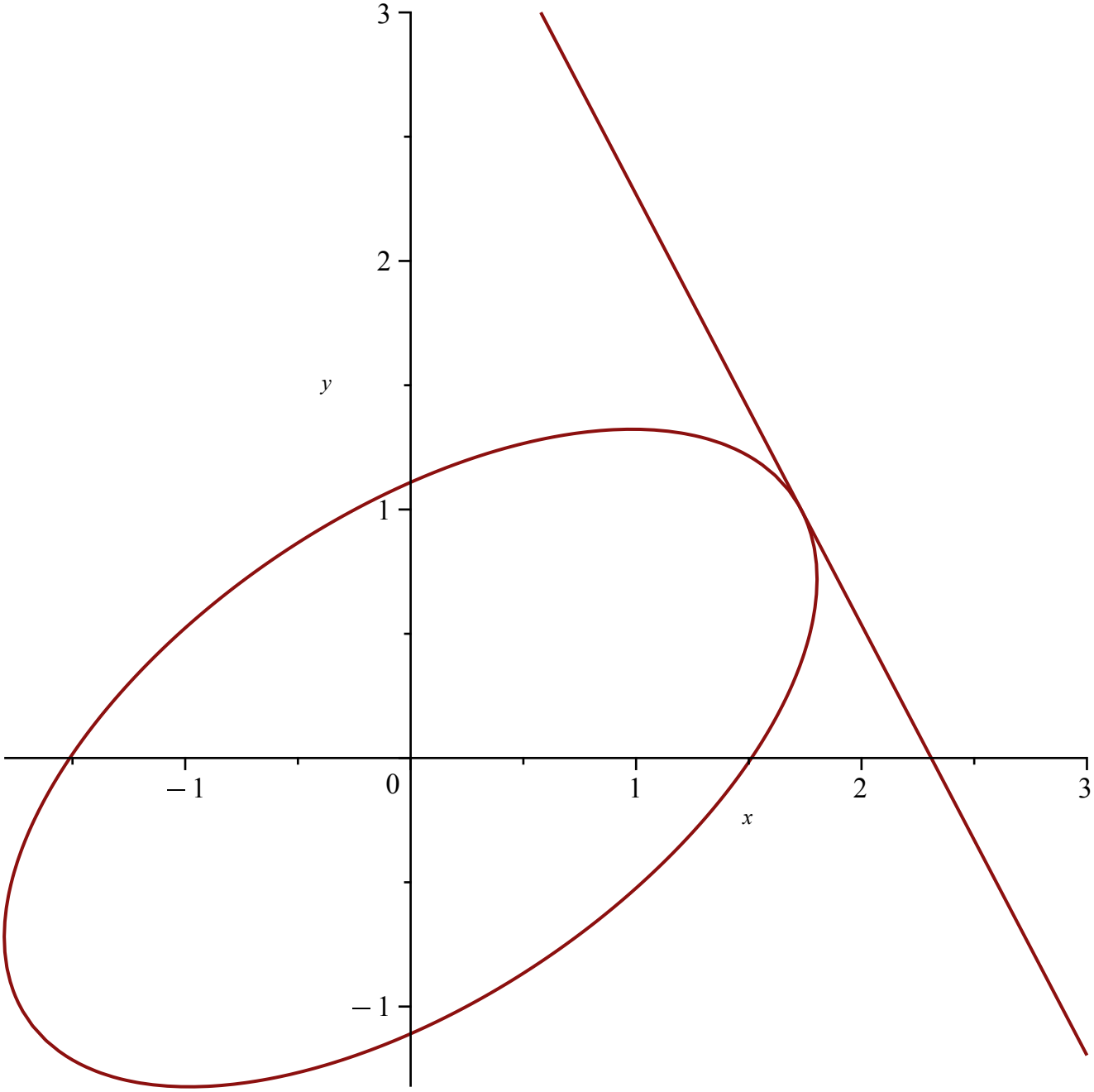
$TL := y = m \cdot (x - \mathrm{sqrt}(3)) + 1;$

$$TL := y = -\sqrt{3}\left(x - \sqrt{3}\right) + 1 \quad \textbf{(14)}$$

with(*plots*)

[*animate*, *animate3d*, *animatecurve*, *arrow*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *conformal3d*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *densityplot*, *display*, *dualaxisplot*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *implicitplot*, *implicitplot3d*, *inequal*, *interactive*, *interactiveparams*, *intersectplot*, *listcontplot*, *listcontplot3d*, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *multiple*, *odeplot*, *pareto*, *plotcompare*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *rootlocus*, *semilogplot*, *setcolors*, *setoptions*, *setoptions3d*, *shadebetween*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*] **(15)**

$\mathit{implicitplot}\left(\{7 \cdot x^2 - 6 \cdot \mathrm{sqrt}(3) \cdot x \cdot y + 13 \cdot y^2 - 16 = 0,\ TL\},\ x = -3..3,\ y = -3..3\right);$



Problem 4:

$$subs\left(x=-4, y=2\cdot\mathrm{sqrt}(3), x^2\cdot y^2-9\cdot x^2-4\cdot y^2=0\right);$$

$$0=0 \qquad \textbf{(16)}$$

$$implicitdiff\left(x^2\cdot y^2-9\cdot x^2-4\cdot y^2=0, y, x\right);$$

$$-\frac{x\left(y^2-9\right)}{y\left(x^2-4\right)} \qquad \textbf{(17)}$$

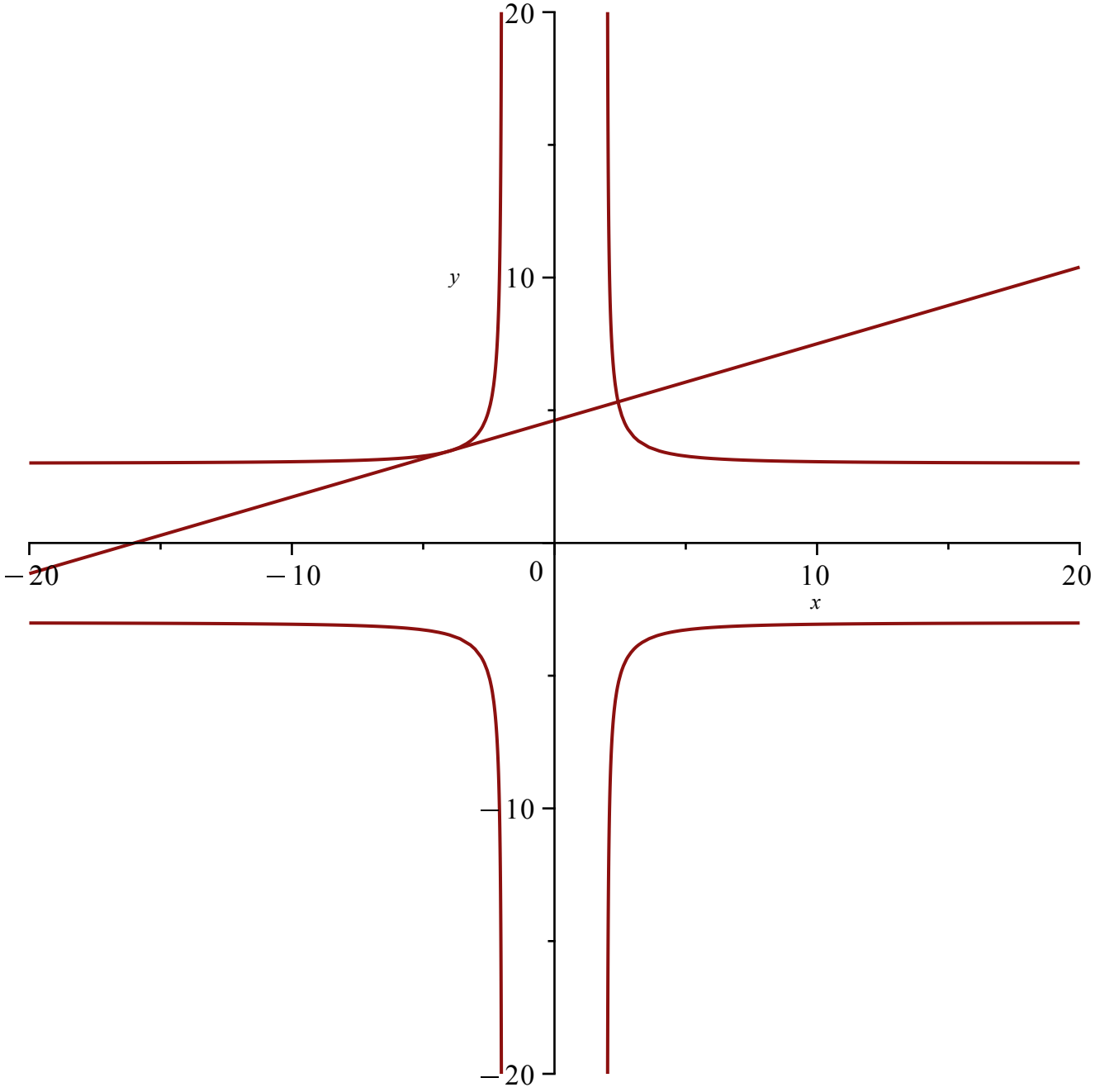
$$m := subs\left(x = -4,\ y = 2\cdot \mathrm{sqrt}(3), -\frac{x\left(y^2-9\right)}{y\left(x^2-4\right)}\right);$$

$$m := \frac{\sqrt{3}}{6} \tag{18}$$

$$TL := y = m\cdot(x-(-4)) + 2\cdot \mathrm{sqrt}(3);$$

$$TL := y = \frac{\sqrt{3}\ (x+4)}{6} + 2\sqrt{3} \tag{19}$$

$$implicitplot\left(\left\{x^2\cdot y^2 - 9\cdot x^2 - 4\cdot y^2 = 0,\ TL\right\}, x = -20..20, y = -20..20\right);$$



Problem 5:

$$subs\left(x=\frac{4}{3}, y=\frac{8}{3}, x^3+y^3-6\cdot x\cdot y=0\right);$$

$$0=0 \quad \textbf{(20)}$$

$$implicitdiff\left(x^3+y^3-6\cdot x\cdot y=0, y, x\right);$$

$$\frac{-x^2+2y}{y^2-2x} \quad \textbf{(21)}$$

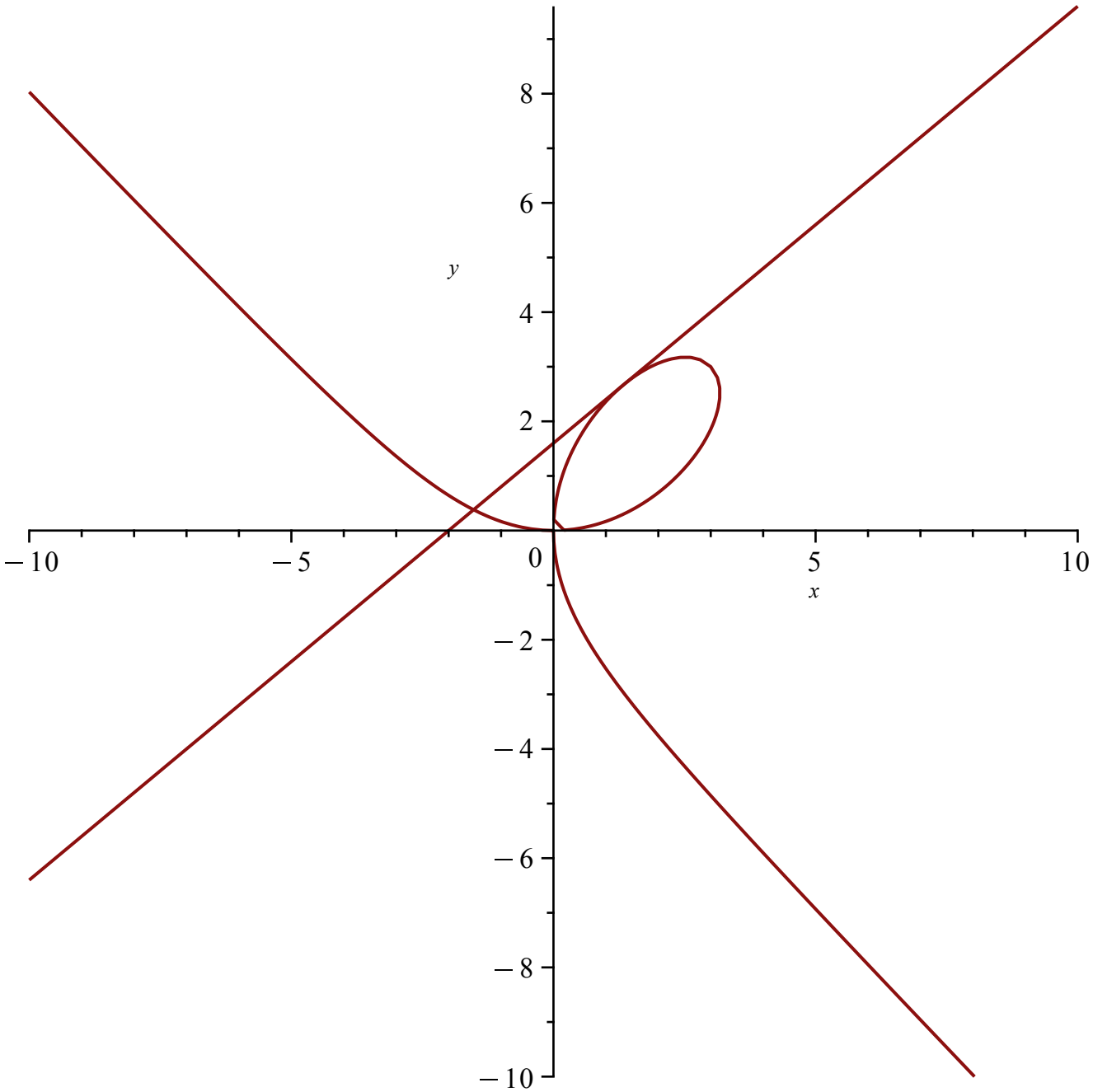
$$m := subs\left(x=\frac{4}{3}, y=\frac{8}{3}, \frac{-x^2+2y}{y^2-2x}\right);$$

$$m := \frac{4}{5} \quad \textbf{(22)}$$

$$TL := y=m\cdot\left(x-\frac{4}{3}\right)+\frac{8}{3};$$

$$TL := y=\frac{4x}{5}+\frac{8}{5} \quad \textbf{(23)}$$

$$implicitplot\left(\left\{x^3+y^3-6\cdot x\cdot y=0, TL\right\}, x=-10..10, y=-10..10\right);$$


8
6
y
4
2
−10
−5
0
5
10
x
−2
−4
−6
−8
−10