Sara Abdorab

Lab 5:

Problem 1A:

$$f := x \mapsto 2 \cdot x^5 - 107 \cdot x + 5$$

$$f := x \mapsto 2 \cdot x^5 - 107 \cdot x + 5 \quad \textbf{(1)}$$

$$\xrightarrow{\text{differentiate}} int(f(x), x);$$

$$\frac{1}{3} x^6 - \frac{107}{2} x^2 + 5 x \quad \textbf{(2)}$$

Problem 1B:

$$g := x \mapsto \frac{2 \cdot x^5 - 107 \cdot x + 5}{x^3 + x + 7}$$

$$g := x \mapsto \frac{2 \cdot x^5 - 107 \cdot x + 5}{x^3 + x + 7} \quad \textbf{(3)}$$

$$\xrightarrow{\text{differentiate}} int(g(x), x);$$

$$\frac{2 x^3}{3} - 2 x + \left(\sum_{\_R = RootOf(\_Z^3 + \_Z + 7)} \frac{\left(-14 \_R^2 - 105 \_R + 19\right) \ln(x - \_R)}{3 \_R^2 + 1} \right) \quad \textbf{(4)}$$

Problem 1C:

$$h := x \mapsto tanx + secx$$

$$h := x \mapsto tanx + secx \quad \textbf{(5)}$$

$$\xrightarrow{\text{differentiate}} int(h(x), x);$$

$$(tanx + secx)\, x \quad \textbf{(6)}$$

Problem 1D:

$$z := x \mapsto \frac{1}{4 + 49 \cdot x^2}$$

$$z := x \mapsto \frac{1}{4 + 49 \cdot x^2} \quad \textbf{(7)}$$

$\xrightarrow{\text{differentiate}}$

$int(z(x), x);$

$$\frac{\arctan\left(\frac{7x}{2}\right)}{14} \tag{8}$$

Problem 2A:

$Int\left(x^3, x = -1..1\right);$

$$\int_{-1}^{1} x^3 \, dx \tag{9}$$

$Int\left(x^3, x = -1..1\right) = int\left(x^3, x = -1..1\right);$

$$\int_{-1}^{1} x^3 \, dx = 0 \tag{10}$$

Problem 2B:

$Int(\log(x), x = -5..-2) = int(\log(x), x = -5..-2);$

$$\int_{-5}^{-2} \ln(x) \, dx = -3 + 5\ln(5) + 3\,I\,\pi - 2\ln(2) \tag{11}$$

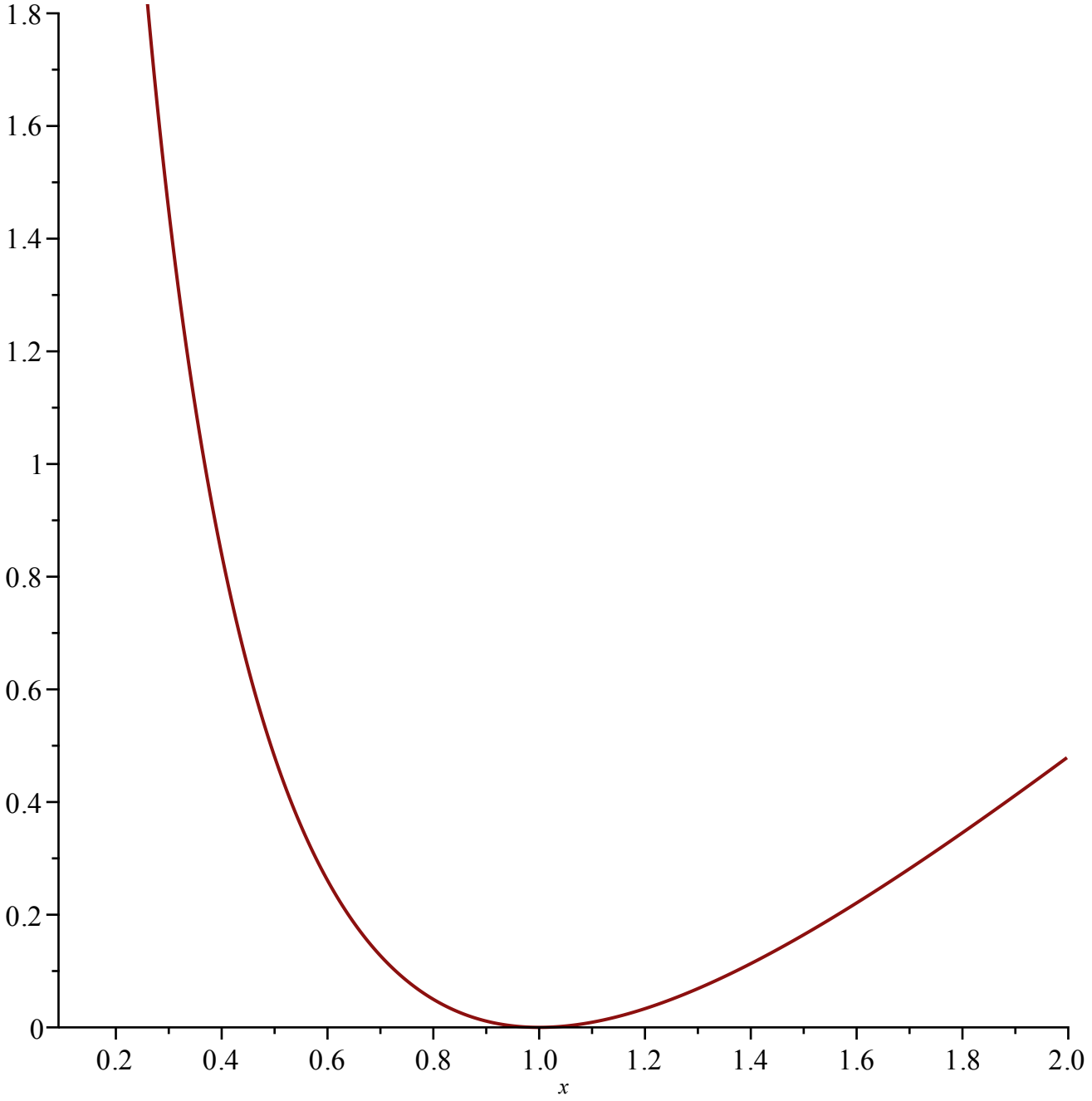
Problem 2C:

$$Int\left(\frac{1}{4 + 49 \cdot x^2}, x = 0..\frac{pi}{14}\right) = int\left(\frac{1}{4 + 49 \cdot x^2}, x = 0..\frac{pi}{14}\right);$$

$$\int_{0}^{\frac{\pi}{14}} \frac{1}{49x^2 + 4} \, dx = \frac{\arctan\left(\frac{\pi}{4}\right)}{14} \tag{12}$$

Problem 3:

$plot\left(\log(x)^2, x = 0..2\right)$



$int\left(\log(x)^2, x = 0..2\right)$

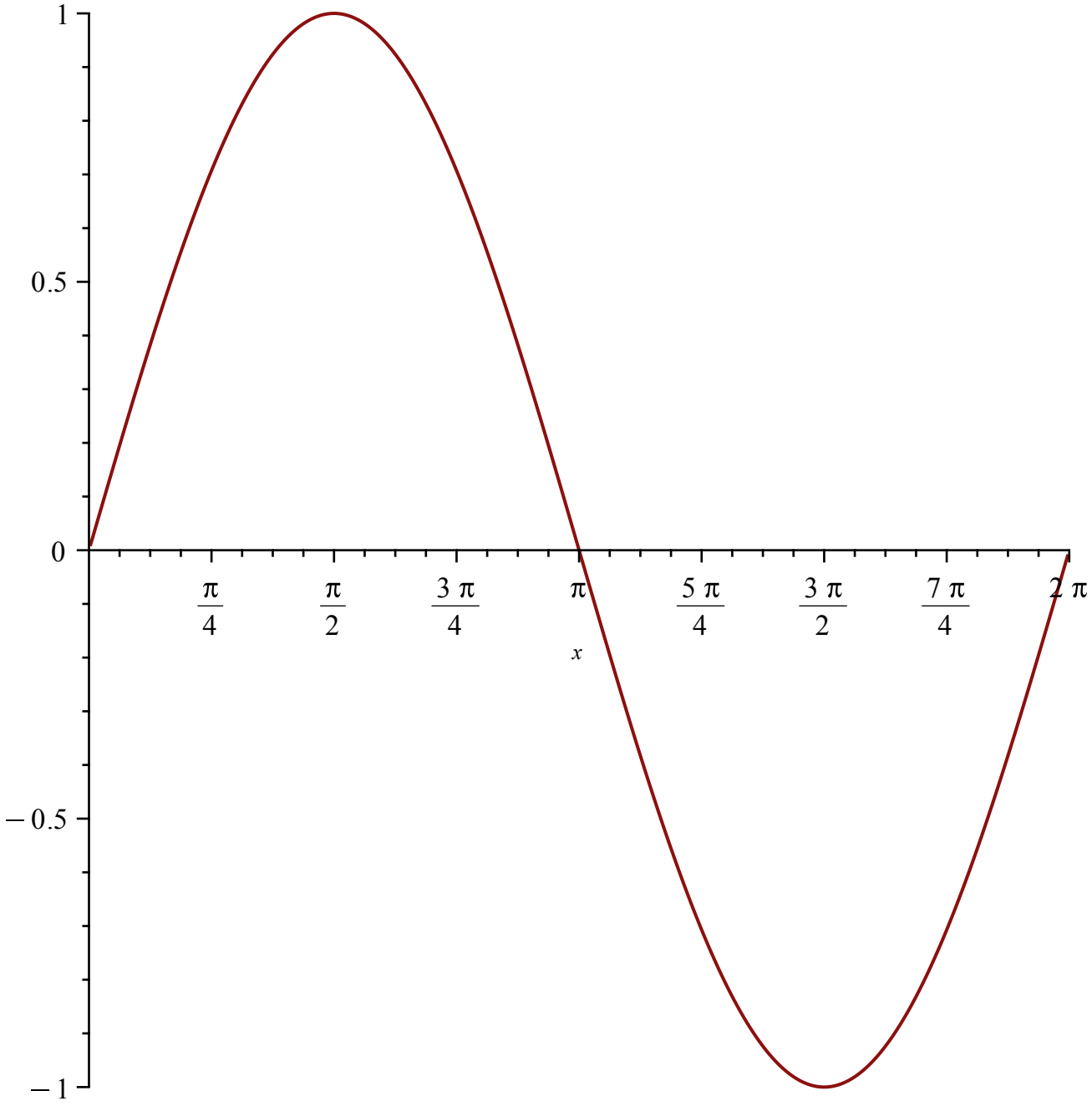
$$2\ln(2)^2 - 4\ln(2) + 4 \quad \textbf{(13)}$$

$evalf(\%)$

$$2.188317306 \quad \textbf{(14)}$$

Problem 4A:

$plot\left(\sin(x), x = 0..2\cdot\pi\right)$



Problem 4B:

$int(\sin(x), x = 0..2)$

$$1 - \cos(2) \quad \textbf{(15)}$$

$evalf(\%)$

$$1.416146836 \quad \textbf{(16)}$$

Problem 4C:

$int(\sin(x), x = 0..2\cdot\pi)$

$$0 \quad \textbf{(17)}$$

$evalf(\%)$

$$0. \quad \textbf{(18)}$$

Problem 5:

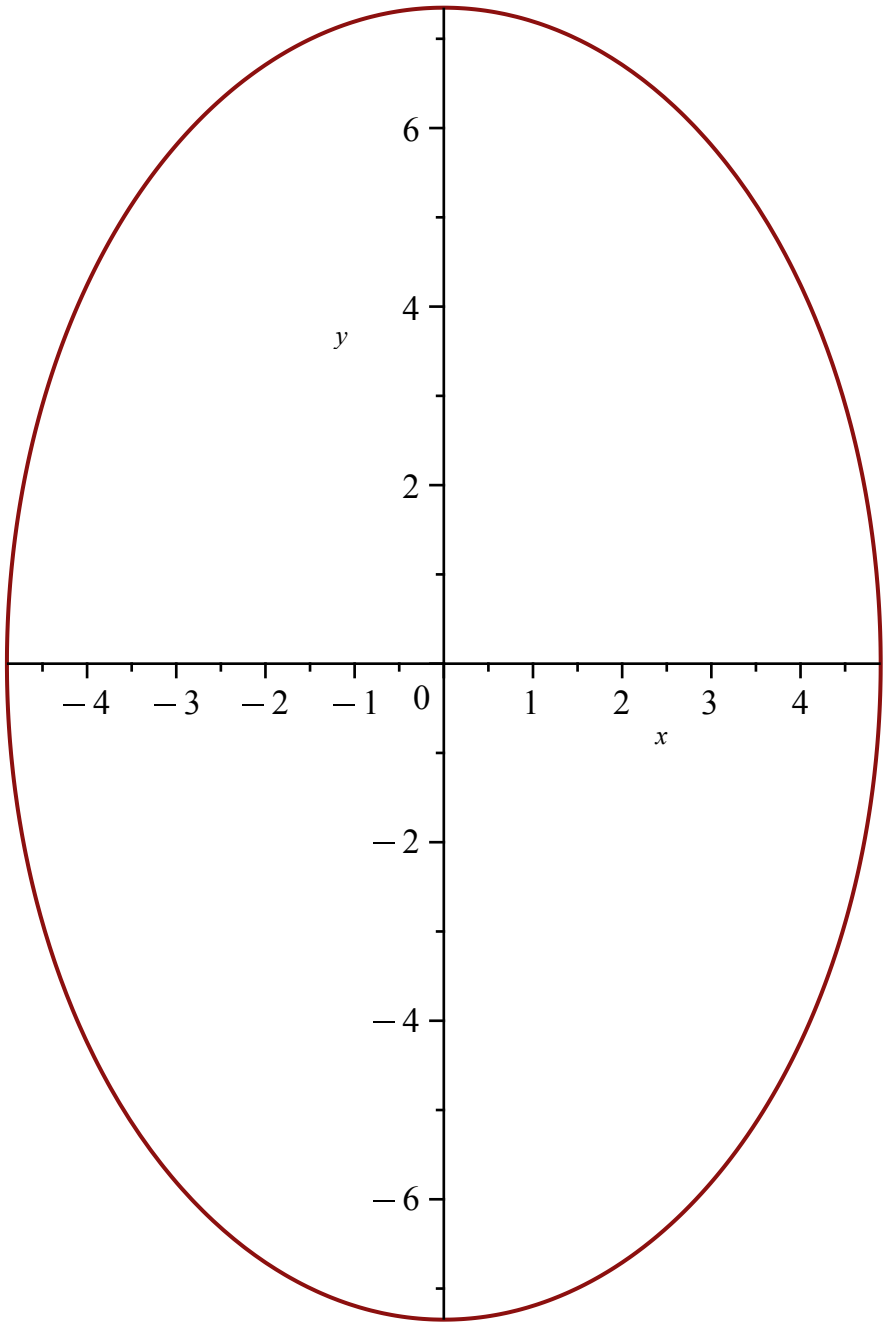
$$eq := \left(\frac{x^2}{24} + \frac{y^2}{54}\right) = 1$$

$$eq := \frac{x^2}{24} + \frac{y^2}{54} = 1 \quad \textbf{(19)}$$

$with(plots)$

$$[animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d, conformal, \quad \textbf{(20)}$$
$$conformal3d, contourplot, contourplot3d, coordplot, coordplot3d, densityplot, display,$$
$$dualaxisplot, fieldplot, fieldplot3d, gradplot, gradplot3d, implicitplot, implicitplot3d, inequal,$$
$$interactive, interactiveparams, intersectplot, listcontplot, listcontplot3d, listdensityplot, listplot,$$
$$listplot3d, loglogplot, logplot, matrixplot, multiple, odeplot, pareto, plotcompare, pointplot,$$
$$pointplot3d, polarplot, polygonplot, polygonplot3d, polyhedra\_supported, polyhedraplot,$$
$$rootlocus, semilogplot, setcolors, setoptions, setoptions3d, shadebetween, spacecurve,$$
$$sparsematrixplot, surfdata, textplot, textplot3d, tubeplot]$$

$implicitplot(eq, scaling = constrained)$


6
4
y
2
−4
−3
−2
−1
0
1
2
3
4
x
−2
−4
−6