Homework 1, Anastasiia Yelchaninova

Task 1

$$S := \frac{1 - a \cdot x}{1 + a \cdot x} \sqrt{\frac{1 + b \cdot x}{1 - b \cdot x}}$$

$$\frac{(-a\,x + 1)\sqrt{\frac{b\,x + 1}{-b\,x + 1}}}{a\,x + 1} \tag{1}$$

$$subs\left(x = \frac{1}{a}\sqrt{\frac{2\,a}{b} - 1}, S\right)$$

$$\frac{\left(-\sqrt{\frac{2\,a}{b} - 1} + 1\right)\sqrt{\frac{\frac{b\sqrt{\frac{2\,a}{b} - 1}}{a} + 1}{-\frac{b\sqrt{\frac{2\,a}{b} - 1}}{a} + 1}}}{\sqrt{\frac{2\,a}{b} - 1} + 1} \tag{2}$$

$$simplify(\%)$$

$$-\frac{\left(\sqrt{\frac{2\,a - b}{b}} - 1\right)\sqrt{-\frac{b\sqrt{\frac{2\,a - b}{b}} + a}{b\sqrt{\frac{2\,a - b}{b}} - a}}}{\sqrt{\frac{2\,a - b}{b}} + 1} \tag{3}$$

Task 2

$$evalf\left(\sin\left(\frac{\pi}{8}\right)^4 + \cos\left(\frac{3\,\pi}{8}\right)^4 + \sin\left(\frac{5\,\pi}{8}\right)^4 + \cos\left(\frac{7\,\pi}{8}\right)^4\right)$$

$$1.500000000 \tag{4}$$

Task 3

$$factor\left(x^3 + 4\,x^2 + 2\,x - 4\right)$$

$$(x + 2)\left(x^2 + 2\,x - 2\right) \tag{5}$$

Task 4

$$simplify\left(\frac{1 + \sin(2\,x) + \cos(2\,x)}{1 + \sin(2\,x) - \cos(2\,x)}\right)$$

$$\frac{1+\cos(2x)}{\sin(2x)} \tag{6}$$

expand(**(6)**)

$$\frac{\cos(x)}{\sin(x)} \tag{7}$$

It's well known that

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

but Maple doesn't know this definition. Sadly :(

Task 5

eval$\left(e^{\frac{i\cdot\pi}{2}}\right)$

$$I \tag{8}$$

evalc$\left(e^{\frac{i\cdot\pi}{2}}\right)$

$$I \tag{9}$$

Task 6

eval$\left(\arctan(3) - \arcsin\left(\frac{\sqrt{5}}{5}\right)\right)$

$$\arctan(3) - \arcsin\left(\frac{1}{5}\sqrt{5}\right) \tag{10}$$

evalf$\left(\arctan(3) - \arcsin\left(\frac{\sqrt{5}}{5}\right)\right)$

$$0.7853981631 \tag{11}$$

Task 7

simplify$\left(\sin(3x)^2 - \sin(2x)^2 - \sin(5x)\cdot\sin(x)\right)$

$$0 \tag{12}$$

Task 8

combine$(\sin(x)\cos(3x))$

$$\frac{1}{2}\sin(4x) - \frac{1}{2}\sin(2x) \tag{13}$$

combine$(\sin(2x)\sin(7x))$

$$\frac{1}{2}\cos(5x) - \frac{1}{2}\cos(9x) \tag{14}$$

$combine(\cos(2x)\cos(6x))$

$$\frac{1}{2}\cos(4x) + \frac{1}{2}\cos(8x) \quad (15)$$

$combine(\sin(nx)\cos(mx))$

$$\frac{1}{2}\sin(mx+nx) - \frac{1}{2}\sin(mx-nx) \quad (16)$$

Task 9

$z := \frac{2-3I}{1+4I} + I^6$

$$-\frac{27}{17} - \frac{11}{17}\,\mathrm{I}$$

$\mathrm{Re}(z)$

$$-\frac{27}{17} \quad (18)$$

$\mathrm{Im}(z)$

$$-\frac{11}{17} \quad (19)$$

$conjugate(z)$

$$-\frac{27}{17} + \frac{11}{17}\,\mathrm{I} \quad (20)$$

Task 10

$z := -1 - I\sqrt{3}$

$$-1 - \mathrm{I}\sqrt{3} \quad (21)$$

$\mathrm{polar}(z)$

$$\mathrm{polar}\left(2, -\frac{2}{3}\pi\right) \quad (22)$$

$evalc\left(z^4\right)$

$$-8 - 8\,\mathrm{I}\sqrt{3} \quad (23)$$