Today, Fri Jan 20, we:

discussed how to integrate the function

> $fun := \mathrm{sqrt}(1+t^2)$

$$fun := \sqrt{t^2+1} \tag{1}$$

> $int(fun, t)$

$$\frac{1}{2}\, t\sqrt{t^2+1} + \frac{1}{2}\operatorname{arcsinh}(t) \tag{2}$$

> $convert(\%, \ln)$

$$\frac{1}{2}\, t\sqrt{t^2+1} + \frac{1}{2}\ln\left(t+\sqrt{t^2+1}\right) \tag{3}$$

solved the equation:

>

> $eq := 2\cdot a\cdot \sin(t) = \frac{2\cdot a}{3}\cdot(1+\sin(t))$

$$eq := 2\, a\sin(t) = \frac{2}{3}\, a\,(1+\sin(t)) \tag{4}$$

> $tt0 := solve(eq, t)$

$$tt0 := \frac{1}{6}\,\pi \tag{5}$$

and have integrated:

> $r1 := 2\cdot a\cdot \sin(t)$

$$r1 := 2\, a\sin(t) \tag{6}$$

> $r2 := a\cdot \mathrm{sqrt}(2\cdot\cos(2\cdot t))$

$$r2 := a\sqrt{2}\,\sqrt{\cos(2\, t)} \tag{7}$$

> $int\left(r1^2 - r2^2, t = tt0\,..\,\frac{\mathrm{Pi}}{2}\right)$

$$a^2\sqrt{3} + \frac{2}{3}\, a^2\,\pi \tag{8}$$

> $rez := int(r1^2 - r2^2, t)$

$$rez := 4\, a^2\left(-\frac{1}{2}\cos(t)\sin(t) + \frac{1}{2}\, t\right) - a^2\sin(2\, t) \tag{9}$$

> $factor(rez)$

$$-a^2\,(2\cos(t)\sin(t) + \sin(2\, t) - 2\, t) \tag{10}$$

> $simplify(rez)$

$$2\, a^2\,(-2\cos(t)\sin(t) + t) \tag{11}$$

> $Int\left(r1^2 - r2^2, t = tt0\,..\,\frac{\mathrm{Pi}}{2}\right)$

(12)

$$\int_{\frac{1}{6}\pi}^{\frac{1}{2}\pi} \left(4\,a^2\,\sin(t)^2 - 2\,a^2\,\cos(2\,t)\right)\,\mathrm{d}t \tag{12}$$

note that Int (with capital I) sets up the integral but does not evaluate