Problem:

$$\int \sqrt{9t^4 + 4t^2}\,\mathrm{d}t$$

Rewrite/simplify:

$$= \int t\sqrt{9t^2 + 4}\,\mathrm{d}t$$

... or choose an alternative:

Skip simplification

Substitute $u = 9t^2 + 4 \longrightarrow \dfrac{\mathrm{d}u}{\mathrm{d}t} = 18t$ (steps) $\longrightarrow$

$$\mathrm{d}t = \frac{1}{18t}\,\mathrm{d}u:$$

$$= \frac{1}{18}\int \sqrt{u}\,\mathrm{d}u$$

Now solving:

$$\int \sqrt{u}\,\mathrm{d}u$$

Apply power rule:

$$\int u^{\mathrm{n}}\,\mathrm{d}u = \frac{u^{\mathrm{n}+1}}{\mathrm{n}+1} \text{ with } \mathrm{n} = \frac{1}{2}:$$

$$= \frac{2u^{\frac{3}{2}}}{3}$$

Plug in solved integrals:

$$\frac{1}{18}\int\sqrt{u}\,\mathrm{d}u$$

$$=\frac{u^{\frac{3}{2}}}{27}$$

Undo substitution $u=9t^2+4$:

$$=\frac{\left(9t^2+4\right)^{\frac{3}{2}}}{27}$$

The problem is solved:

$$\int t\sqrt{9t^2+4}\,\mathrm{d}t$$

$$=\frac{\left(9t^2+4\right)^{\frac{3}{2}}}{27}+C$$

ANTIDERIVATIVE COMPUTED BY MAXIMA:

$\int \boldsymbol{f(t)}\,\mathbf{dt} = \boldsymbol{F(t)} =$

$$\frac{t\left(\frac{\left(9t^2+4\right)^{\frac{3}{2}}}{27}-\frac{8}{27}\right)}{|t|}+C$$

Simplify/rewrite:

$$\frac{t\left(\left(9t^2+4\right)^{\frac{3}{2}}-8\right)}{27\,|t|}+C$$

DEFINITE INTEGRAL:

$$\int_0^2 f(t)\,\mathrm{d}t =$$

$$\frac{8\cdot 10^{\frac{3}{2}}}{27} - \frac{8}{27}$$

Simplify/rewrite:

$$\frac{8\cdot 10^{\frac{3}{2}} - 8}{27}$$

Approximation:

$$9.073415289387791$$

Simplify