

restart;

$$f := t \rightarrow \left[ (t^2 - 2) \cdot (t + 3), \frac{3 \cdot \sin(\pi \cdot t)}{\pi} \right]$$
$$t \rightarrow \left[ (t^2 - 2) (t + 3), \frac{3 \sin(\pi t)}{\pi} \right] \quad (1)$$

X-Achse: y=0

EnvAllSolutions := true :  
solve(f(t)<sub>2</sub>=0, t)

$$\_Z1 \sim \quad (2)$$

subs(t=-1, f(t))

$$\left[ -2, \frac{3 \sin(-\pi)}{\pi} \right] \quad (3)$$

subs(t=0, f(t))

$$\left[ -6, \frac{3 \sin(0)}{\pi} \right] \quad (4)$$

subs(t=1, f(t))

$$\left[ -4, \frac{3 \sin(\pi)}{\pi} \right] \quad (5)$$

subs(t=2, f(t))

$$\left[ 10, \frac{3 \sin(2\pi)}{\pi} \right] \quad (6)$$

Y-Achse: x=0

solve(f(t)<sub>1</sub>=0, t)

$$-3, \sqrt{2}, -\sqrt{2} \quad (7)$$

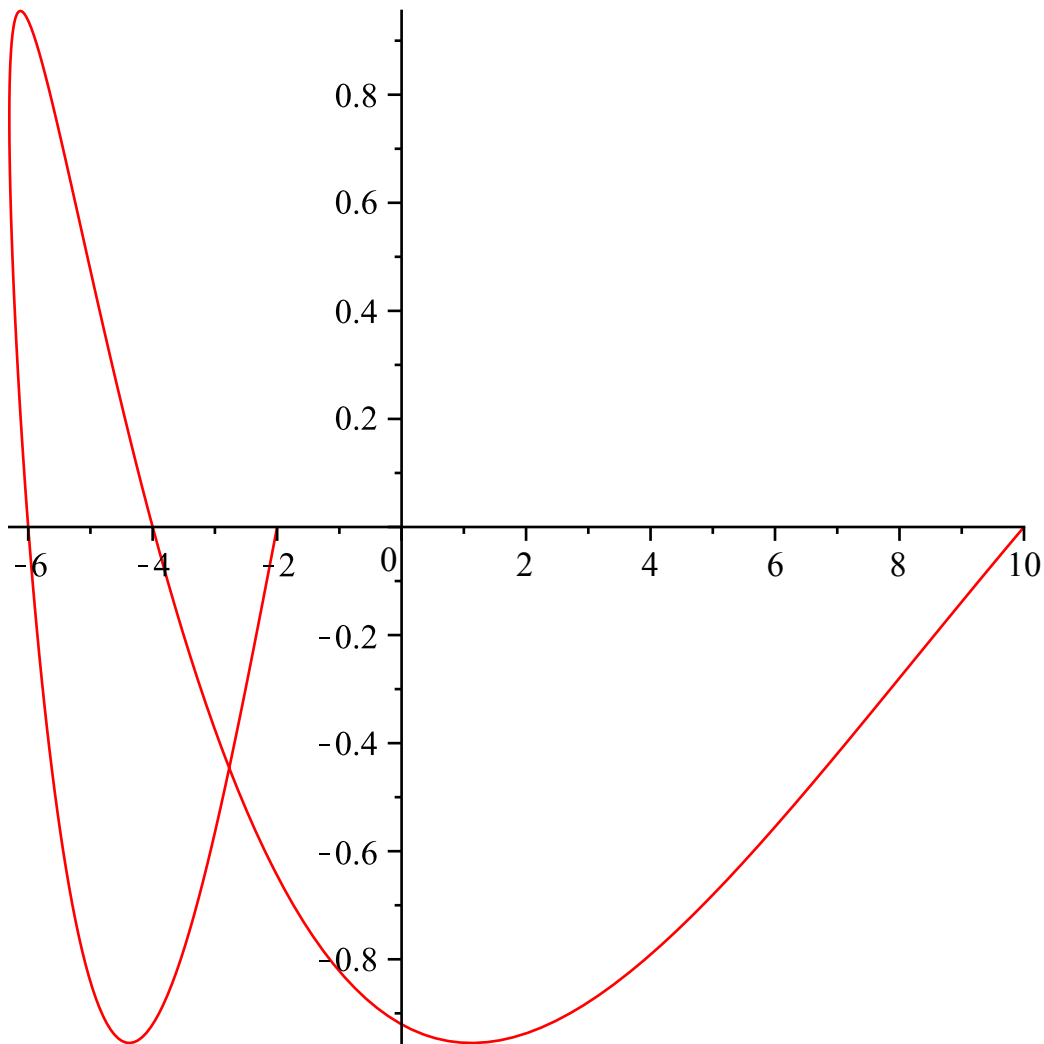
subs(t= $\sqrt{2}$ , f(t))

$$\left[ 0, \frac{3 \sin(\pi \sqrt{2})}{\pi} \right] \quad (8)$$

evalf(%)

$$[0., -0.9204591165] \quad (9)$$

plot([f(t)[1], f(t)[2], t=-1..2])



$fd := \text{diff}(f(t), t)$

$$[2t(t+3) + t^2 - 2, 3 \cos(\pi t)] \quad (10)$$

$grad := \sqrt{(fd_1)^2 + (fd_2)^2}$

$$\sqrt{(2t(t+3) + t^2 - 2)^2 + 9 \cos(\pi t)^2} \quad (11)$$

$\text{subs}(t=-1, grad); \text{evalf}(\%)$

$$\sqrt{25 + 9 \cos(-\pi)^2}$$

5.830951895 (12)

$\text{subs}(t=0, grad); \text{evalf}(\%)$

$$\sqrt{4 + 9 \cos(0)^2}$$

3.605551275 (13)

$\text{subs}(t=1, grad); \text{evalf}(\%)$

$$\sqrt{49 + 9 \cos(\pi)^2}$$

7.615773106 (14)

*subs(t=2, grad); evalf(%)*

$$\frac{\sqrt{484 + 9 \cos(2 \pi)^2}}{22.20360331}$$

**(15)**

*subs(t= $\sqrt{2}$ , grad); evalf(%)*

$$\frac{\sqrt{8 (\sqrt{2} + 3)^2 + 9 \cos(\pi \sqrt{2})^2}}{12.51080646}$$

**(16)**