

> with(plots); fe := **proc**(f) fnormal(evalf(f)); **end**: (1)  
 [animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d,  
 conformal, 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, spacecurve, sparsematrixplot, surfdata, textplot, textplot3d, tubeplot]

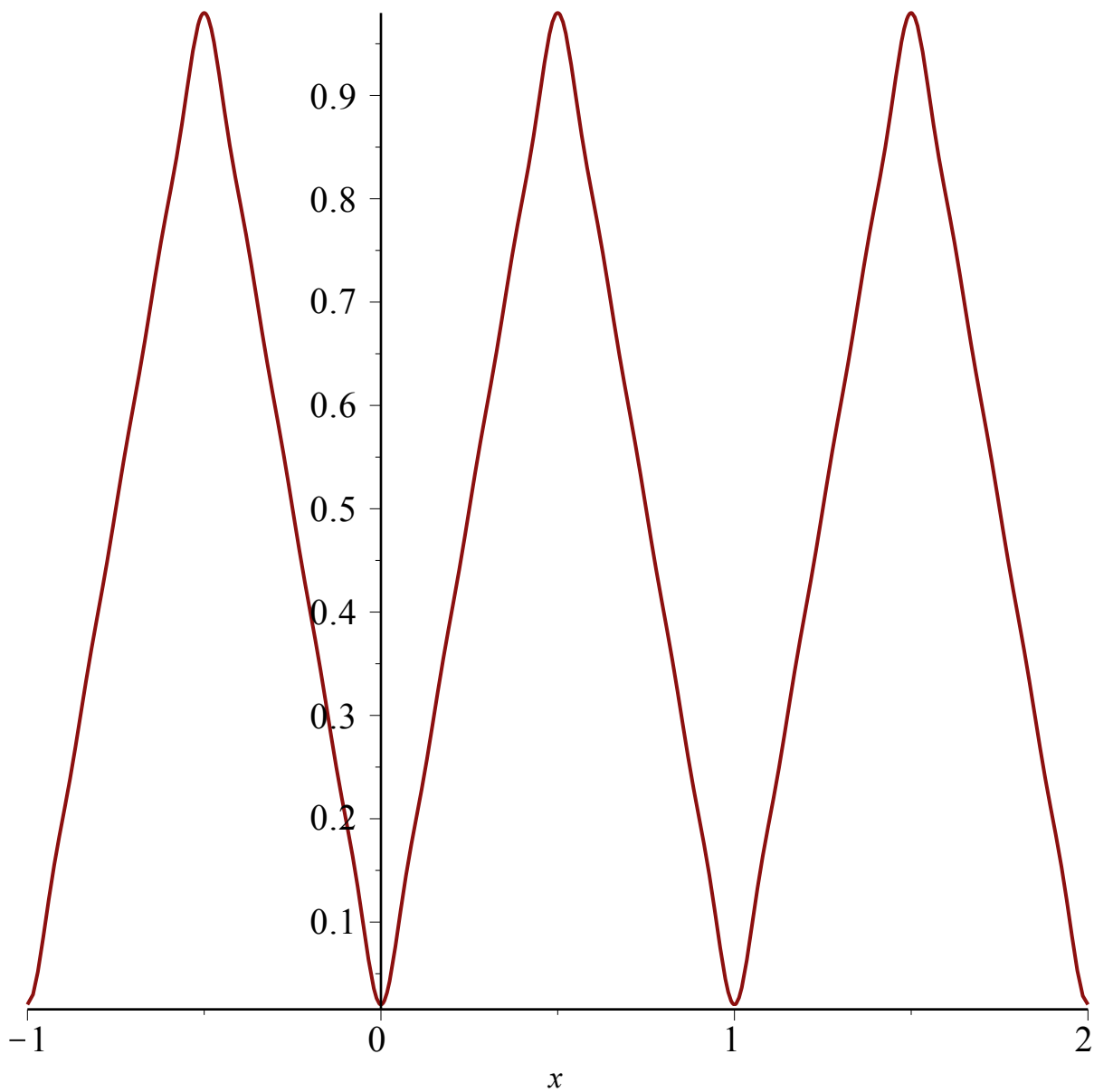
> a := **proc**(f, n)  
**if** n = 0 **then** fe  $\left( \frac{1}{L} \cdot \int_0^L f dx \right)$ ;  
**else** fe  $\left( \frac{2}{L} \cdot \int_0^L f \cdot \cos\left(\frac{n \cdot \pi \cdot x}{L}\right) dx \right)$ ;  
**fi**;  
**end**:  
 > L := 1; fun := 
$$\begin{cases} \frac{2x}{L} & 0 < x < \frac{L}{2} \\ \frac{2}{L}(L-x) & L > x \geq \frac{L}{2} \end{cases}$$
  
 L := 1  

$$fun := \begin{cases} 2x & 0 < x \text{ and } x < \frac{1}{2} \\ 2 - 2x & x < 1 \text{ and } \frac{1}{2} \leq x \end{cases}$$
 (2)

> fun\_even := (f, n) →  $\sum_{k=0}^n 'a(f, k) \cdot \cos\left(\frac{k \cdot \pi \cdot x}{L}\right)'$ ; n := 20; fun\_even(fun, n);  
 plot({fun\_even(fun, n)}, x = -L .. 2L)  

$$fun\_even := (f, n) \rightarrow \sum_{k=0}^n 'a(f, k) \cos\left(\frac{k \pi x}{L}\right)'$$
  
 n := 20

$$0.5000000000 - 0.4052847344 \cos\left(\frac{2 \pi x}{L}\right) - 0.04503163715 \cos\left(\frac{6 \pi x}{L}\right) \\
- 0.01621138938 \cos\left(\frac{10 \pi x}{L}\right) - 0.008271117028 \cos\left(\frac{14 \pi x}{L}\right) \\
- 0.005003515240 \cos\left(\frac{18 \pi x}{L}\right)$$



$$> \text{fun\_sol} := (f, n) \rightarrow \sum_{k=0}^n 'a(f, k) \cdot \cos\left(\frac{k \cdot \pi \cdot x}{L}\right) \cdot e^{-\left(\frac{c \cdot k \cdot \pi}{L}\right)^2 \cdot t},$$

$$\text{fun\_sol} := (f, n) \rightarrow \sum_{k=0}^n 'a(f, k) \cos\left(\frac{k \pi x}{L}\right) e^{-\frac{c^2 k^2 \pi^2 t}{L^2}}, \quad (3)$$

> n := 20; fun\_sol(fun, n);

$$\begin{aligned} & n := 20 \\ & 0.5000000000 - 0.4052847344 \cos\left(\frac{2 \pi x}{L}\right) e^{-\frac{4 c^2 \pi^2 t}{L^2}} \\ & - 0.04503163715 \cos\left(\frac{6 \pi x}{L}\right) e^{-\frac{36 c^2 \pi^2 t}{L^2}} - 0.01621138938 \cos\left(\frac{10 \pi x}{L}\right) e^{-\frac{100 c^2 \pi^2 t}{L^2}} \end{aligned} \quad (4)$$

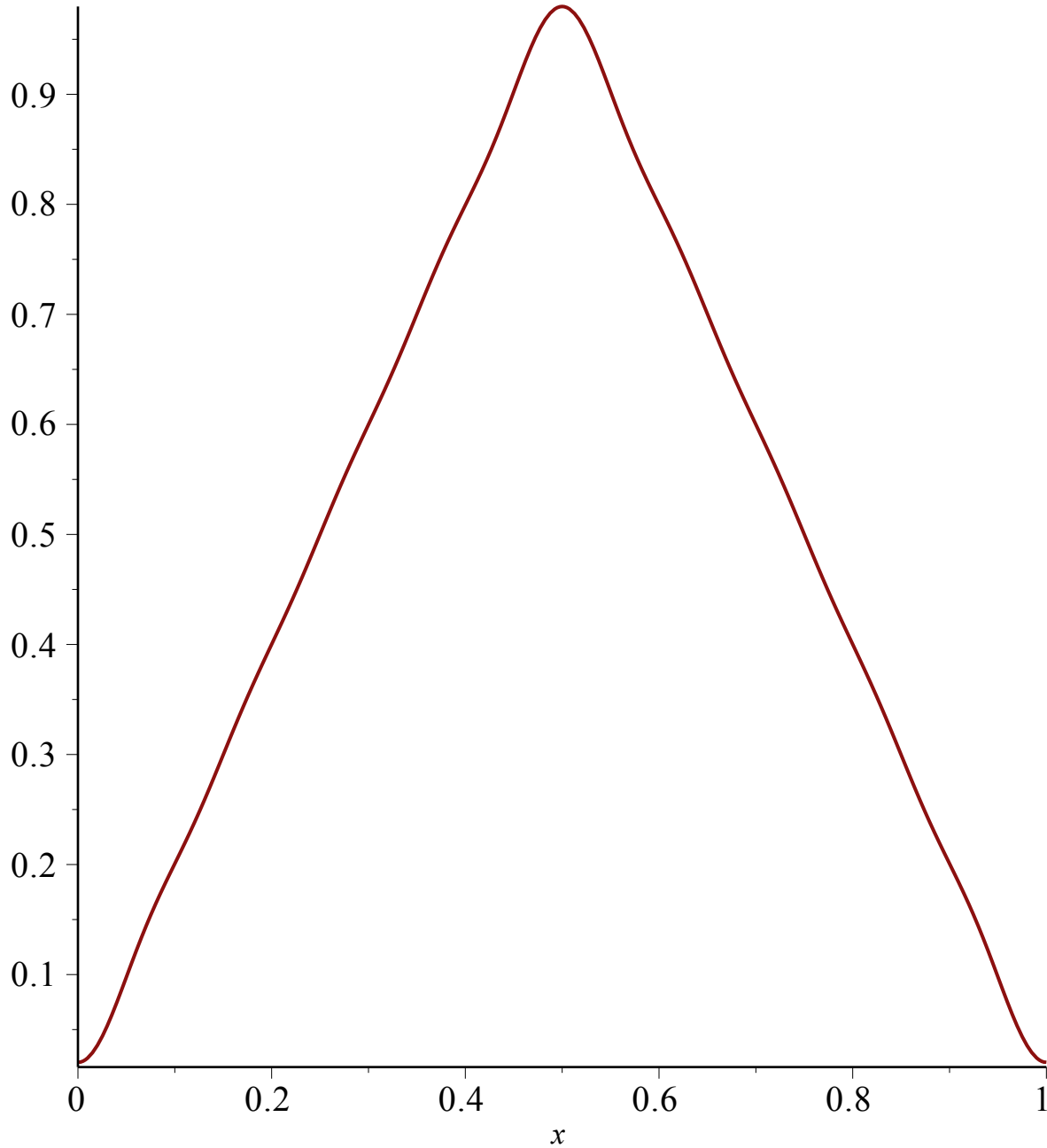
$$- 0.008271117028 \cos\left(\frac{14 \pi x}{L}\right) e^{-\frac{196 c^2 \pi^2 t}{L^2}}$$

$$- 0.005003515240 \cos\left(\frac{18 \pi x}{L}\right) e^{-\frac{324 c^2 \pi^2 t}{L^2}}$$

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> c := 0.1; animate(plot, [{fun_sol(fun, n)}, x = 0..L], t = 0..20, frames = 100)
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c := 0.1
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$t = 0.$



L >