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> # Define initial velocity
> g := x → sin(Pi*x) ^ 2 * cos(2*Pi*x);

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$$g := x \mapsto \sin(\pi \cdot x)^2 \cdot \cos(2 \cdot \pi \cdot x) \quad (1)$$

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> t_n := n → (2 / (n * Pi)) * int(g(x) * cos(n * Pi * x), x = 0 .. 1);

```

$$t_n := n \mapsto \frac{2 \cdot \left(\int_0^1 g(x) \cdot \cos(\pi \cdot n \cdot x) \, dx \right)}{\pi \cdot n} \quad (2)$$

```

>
> # Maar eerst moesten we de algemene oplossing vinden
> pde := diff(u(x, t), t$2) = diff(u(x, t), x$2);

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$$pde := \frac{\partial^2}{\partial t^2} u(x, t) = \frac{\partial^2}{\partial x^2} u(x, t) \quad (3)$$

```

> # Define boundary conditions
bc := D[1](u)(0, t) = 0, D[1](u)(1, t) = 0;

```

$$bc := D_1(u)(0, t) = 0, D_1(u)(1, t) = 0 \quad (4)$$

```

> # Define initial conditions
ic := u(x, 0) = 0, D[2](u)(x, 0) = sin(Pi*x) ^ 2 * cos(2*Pi*x);

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$$ic := u(x, 0) = 0, D_2(u)(x, 0) = \sin(\pi x)^2 \cos(2 \pi x) \quad (5)$$

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> sol := pdsolve([pde, bc, ic], u(x, t));

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$$sol := u(x, t) = -\frac{t}{4} + \frac{\cos(2 \pi x) \sin(2 \pi t)}{4 \pi} - \frac{\cos(4 \pi x) \sin(4 \pi t)}{16 \pi} \quad (6)$$