

```
In [12]: import scipy
from sympy import *
import math
import matplotlib
```

```
In [14]: L = Symbol('L')
x = Symbol('x')

integrate(x * (2/L) * sin(pi * x / L)**2, (x, 0, L))

L/(2*pi**2) + 2*(-L**2/(4*pi**2) + L**2/4)/L
Simplified, this is L/2
```

```
In [7]: L = Symbol('L')
x = Symbol('x')

integrate((x-L/2)**2 * (2/L) * sin(pi * x / L)**2, (x,0,L))
```

Out[7]:
$$-\frac{L^2}{2\pi^2} + \frac{L^2}{12}$$

The square root of this is $L/\sqrt{2} * (1/\sqrt{6} - 1/\pi)$

```
In [18]: init_printing()
expr = latex(L/sqrt(2) * (1/sqrt(6) - 1/pi))
print(expr)

\frac{\sqrt{2} L \left(- \frac{1}{\pi} + \frac{\sqrt{6}}{6}\right)}{2}
```