> $bn :=$

$$\frac{1}{int\left(\sin^2\left(\frac{n\cdot \mathrm{Pi}\cdot x}{L}\right), x=0..L\right)}\left(int\left(\frac{2\cdot M\cdot x}{L}\cdot\sin\left(\frac{n\cdot \mathrm{Pi}\cdot x}{L}\right), x=0..\frac{L}{2}\right)\right.$$
$$\left. + int\left(\frac{2\cdot M\cdot (L-x)}{L}\cdot\sin\left(\frac{n\cdot \mathrm{Pi}\cdot x}{L}\right), x=\frac{L}{2}..L\right)\right) \text{assuming}\,(L>0, n, integer)$$

$$bn := \frac{2\left(-\frac{L\left(n\,\pi\cos\left(\frac{n\,\pi}{2}\right)-2\sin\left(\frac{n\,\pi}{2}\right)\right)M}{\pi^2 n^2}+\frac{L\left(n\,\pi\cos\left(\frac{n\,\pi}{2}\right)+2\sin\left(\frac{n\,\pi}{2}\right)\right)M}{\pi^2 n^2}\right)}{L} \quad \textbf{(1)}$$

> $bn := simplify(bn)$

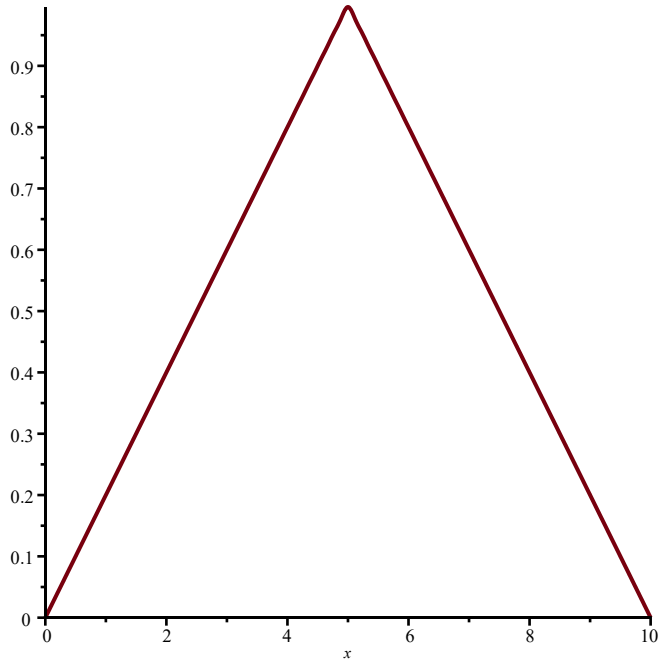
$$bn := \frac{8\,M\sin\left(\frac{n\,\pi}{2}\right)}{\pi^2 n^2} \quad \textbf{(2)}$$

> $\mathrm{phi} := \sin\left(\frac{n\cdot \mathrm{Pi}\cdot x}{L}\right)$

$$\phi := \sin\left(\frac{n\,\pi\,x}{L}\right) \quad \textbf{(3)}$$

> $psum := subs(M=1, L=10, sum(bn\cdot \mathrm{phi}, n=1..100))$:

> $plot(psum, x=0..10)$



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