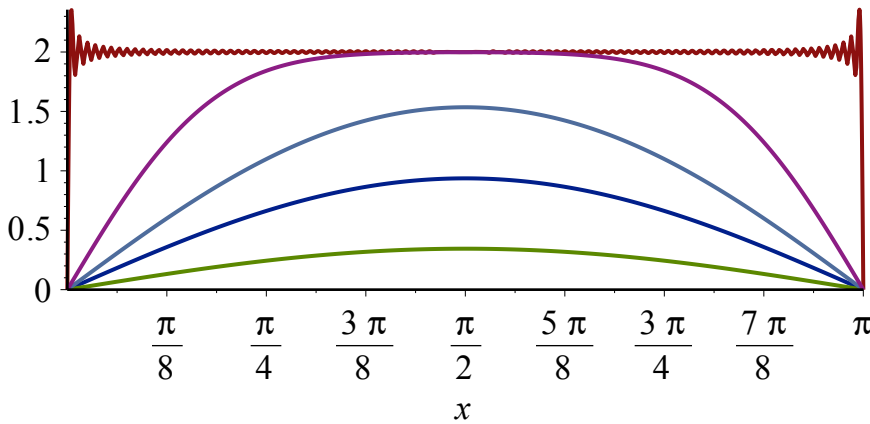


**Heat Equation**  
**PDE:  $u_t = u_{xx}, 0 < x < \pi, t > 0$**   
**BC:  $u(0,t) = 0 = u(\pi,t), t > 0$**   
**IC:  $u(x,0) = 2, 0 < x < \pi$**

$$u(x, t) := \text{sum} \left( \frac{4}{n \cdot \pi} \cdot (1 - (-1)^n) \cdot \exp(-n^2 \cdot t) \cdot \sin(n \cdot x), n = 1 \dots 200 \right); \text{plot}(\{u(x, 0), u(x, .1), u(x, .5), u(x, 1), u(x, 2)\}, x = 0 \dots \pi)$$

$$(x, t) \rightarrow \sum_{n=1}^{200} \frac{4 (1 - (-1)^n) e^{-n^2 t} \sin(n x)}{n \pi}$$



**Laplace's Equation**  
**PDE:  $u_{xx} + u_{yy} = 0, 0 < x < \pi, 0 < y < \pi$**   
**BC for y:  $u(x,0) = 0 = u(x,\pi), 0 < x < \pi$  (homogeneous)**  
**BC for x:  $u(0,y) = 0, u(\pi,y) = 50, 0 < y < \pi$**

$$u(x, y) := \text{sum} \left( \frac{100}{n \cdot \pi \cdot \sinh(n \cdot \pi)} \cdot (1 - (-1)^n) \cdot \sinh(n \cdot x) \cdot \sin(n \cdot y), n = 1 \dots 200 \right); \text{plot3d}(u(x, y), x = 0 \dots \pi, y = 0 \dots \pi);$$

$$(x, y) \rightarrow \sum_{n=1}^{200} \frac{100 (1 - (-1)^n) \sinh(n x) \sin(n y)}{n \pi \sinh(n \pi)}$$

