# 4. F4.

## 4(a)

2/2 points (graded)

Find all negative real numbers $\lambda_k$ for $k = 1, 2, 3, \ldots$, for which the boundary value problem

$$\begin{aligned} \frac{d^2}{dx^2} v_k(x) &= \lambda_k v_k(x) \\ v_k(0) &= 0 \\ v_k(\pi/6) &= 0 \end{aligned}$$

has a solution $v_k(x)$ that is not the zero function.

(Note that $\lambda_k$ is negative, $k$ is nonnegative, and $|\lambda_1| < |\lambda_2| < |\lambda_3| < \cdots$.)

$\lambda_k =$ -36*k^2 ✔

$-36 \cdot k^2$

Find the $k = 1$ eigenfunction $v_1(x)$ with amplitude $1$.

$v_1(x) =$ sin(6*x) ✔

$\sin(6 \cdot x)$

FORMULA INPUT HELP

Submit You have used 1 of 3 attempts

✔ Correct (2/2 points)

## 4(b)

2/2 points (graded)

Find all negative real numbers $\lambda_k$ for $k = 0, 1, 2, 3, \ldots$, for which the boundary value problem

$$\begin{aligned} \frac{d^2}{dx^2} v_k(x) &= \lambda_k v_k(x) \\ v_k'(0) &= 0 \\ v_k(\pi) &= 0 \end{aligned}$$

has a solution $v_k(x)$ that is not the zero function.

(Note that $\lambda_k$ is negative, $k$ is nonnegative, and $|\lambda_0| < |\lambda_1| < |\lambda_2| < \cdots$.)

$\lambda_k =$ -(k+1/2)^2 ✔

$-\left(k + \frac{1}{2}\right)^2$

Find the $k = 0$ eigenfunction $v_0(x)$ with amplitude $1$.

$v_0(x) =$ cos(x/2) ✔

$\cos\left(\frac{x}{2}\right)$

FORMULA INPUT HELP

Submit You have used 1 of 3 attempts

✔ Correct (2/2 points)