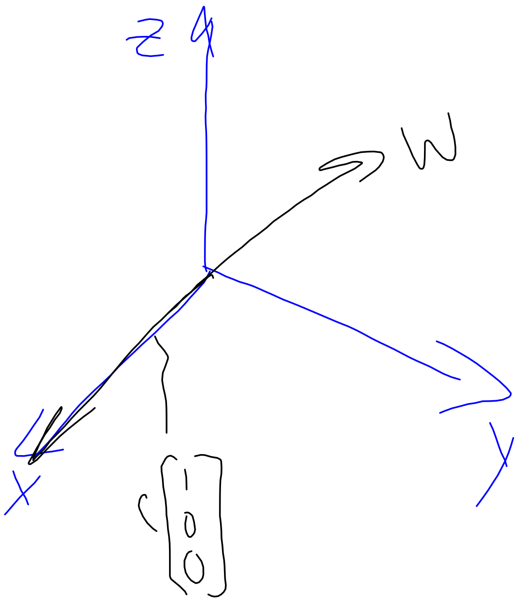
In $\mathbb{R}^3$, let W be the x-axis.
What is $W^\perp$? Give a basis $\mathcal{B}$ for $W^\perp$.

$$\vec{v} = \overset{\in W}{\vec{w}} + \overset{\in W^\perp}{\vec{w}_\perp}$$

$$\dim(V) = \dim(W) + \dim(W^\perp)$$

$$\mathcal{B}_{W^\perp} = \left\{ \begin{bmatrix} 0 \\ 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 0 \\ 3 \\ -1 \end{bmatrix} \right\}$$



Exam 4, #8

in $\mathbb{R}^3$ $W = \text{span}\left\{\begin{bmatrix}1\\1\\0\end{bmatrix}\right\}$

$W^\perp$ is a plane, so a basis contains 2 vectors.

$$\mathcal{B}_{W^\perp} = \left\{\begin{bmatrix}0\\0\\1\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}\right\}$$

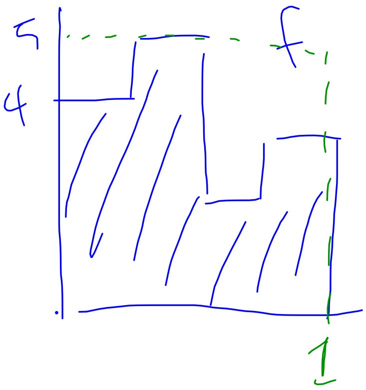
$\mathcal{F}[-a,a]$ Exam 4, #10

Start with $f \in \mathcal{F}[-a,a]$ with $\langle f,g\rangle = \int_{-a}^{a} f(x)g(x)\,dx$

$g(x) = \frac{f(x)+f(-x)}{2} \rightarrow g$ is even

$h(x) = \frac{f(x)-f(-x)}{2} \rightarrow h$ is odd

$(g+h)(x) = f(x)$



$$\|f\|_\infty = 5$$

$$\|f\|_1 = \int_0^1 |f(x)|\,dx = \int_0^1 f(x)\,dx$$

$$= \int_0^{\frac{1}{4}} 4\,dx + \int_{\frac{1}{4}}^{\frac{1}{2}} 5\,dx + \dots$$

$$\|f\|_2 = \sqrt{\frac{1}{1-0}\int_0^1 [f(x)]^2\,dx}$$

$$\int_0^1 [f(x)]^2\,dx = \int_0^{\frac{1}{4}} 16\,dx + \int_{\frac{1}{4}}^{\frac{1}{2}}$$

Legendre Handout

* 1-14 due Friday
* 15-20 due Monday

$\{1, x, x^2, x^3, \ldots\}$ is a basis for $\mathcal{P}$

on $[-1,1]$, $\langle f,g\rangle = \int_{-1}^{1} f(x)g(x)\,dx$

G-S $\rightarrow$ $\{1, x, x^2-\frac{1}{3}, x^3-\frac{3}{5}x, \ldots\}$ orthogonal set

$P_0(x) = 1$

$$P_{n+1}(x) = \frac{(2n+1)xP_n(x) - nP_{n-1}(x)}{n+1} \qquad (2)$$