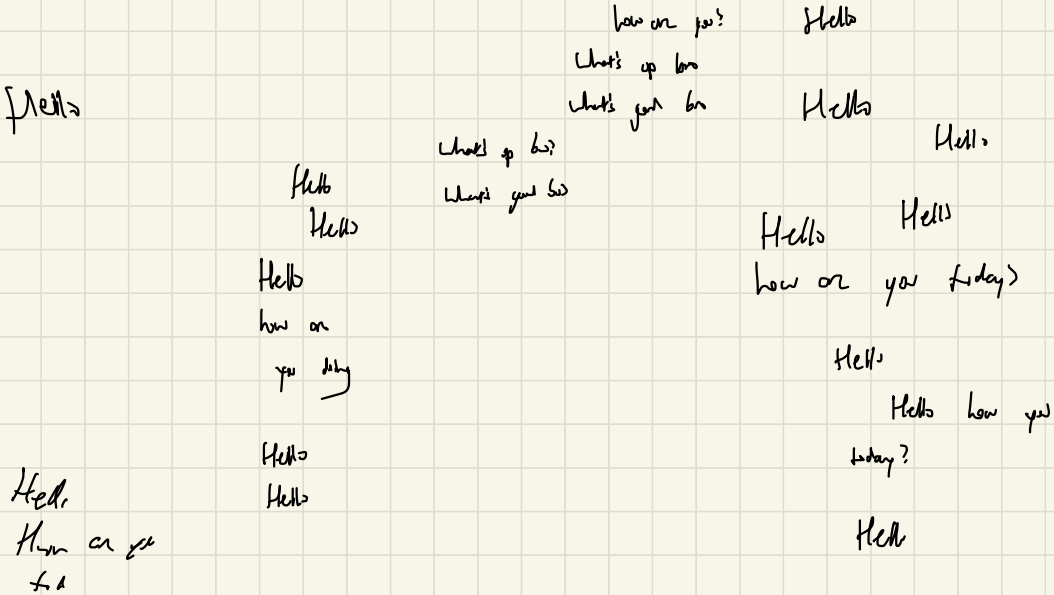

how are you?
What's up bro
What's good bro
Hello
Hello
Hello
Hello
Hello
Hello
Hello
What's up bro?
What's good bro
Hello
Hello
Hello
how are you today
Hello
Hello how you
today?
Hello
Hello
Hello
Hello
Hello
how are you
today
Hello
Hello
Hello
Hello
Hello
how are you
today

We apply the Gram-Schmidt Process to

$$2x_1 + x_2 + x_3 = 5 \qquad 2x_1 + 2 + 1 = 5 \to 2x_1 = 2 \to x_1 = 1$$
$$x_2 + 2x_3 = 4 \qquad x_2 + 2 = 4 \to x_2 = 2$$
$$3x_3 = 3 \qquad x_3 = 1$$

$$A\vec{v} = \begin{bmatrix} 4+3+3 \\ -2-3 \\ -6-3-6 \end{bmatrix} = \begin{bmatrix} 10 \\ -5 \\ -15 \end{bmatrix} = -5\begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}$$

$$A\vec{v} = 7\vec{v}$$
$$A(2\vec{v}) = x(2\vec{v})$$
$$2(A\vec{v}) = 2x(\vec{v})$$
$$2(7\vec{v}) = 2x(\vec{v})$$
$$x = 7$$

$$\cos x \approx 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!}$$

$$\cos 2x \approx 1 - \frac{(2x)^2}{2!} + \frac{(2x)^4}{4!} + \frac{(2x)^6}{6!}$$

Let $f(x) = \cos 2x$

$f'(x) = -2\sin 2x$

$f''(x) = -4\cos 2x$

$f'''(x) = 8\sin 2x$

$f^{(4)}(x) = 16\cos 2x$

$f^{(5)}(x) = -32\sin 2x$

$f^{(6)}(x) = -64\cos 2x$

$$f(x) \approx f(0) + \frac{f'(0)x^1}{1!} + \frac{f''(0)x^2}{2!} + \frac{f'''(0)x^3}{3!} + \frac{f^{(4)}(0)x^4}{4!} + \dots$$

$$\cos 2x \approx \cos(0) + \frac{-2\sin 0\, x}{1!} + \frac{-4\cos(0)x^2}{2!} + \frac{8\sin(0)x^3}{3!} + \frac{16\cos(0)x^4}{4!} + \frac{-32\sin(0)x^5}{5!} + \frac{-64\cos(0)x^6}{6!}$$

$$= 1 + 0 + \frac{-4x^2}{2!} + 0 + \frac{16x^4}{4!} + 0 + \frac{-64x^6}{6!}$$

$$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

find eigenvalues

$$P_A = \lambda^2 - \text{tr}(A)\lambda + \det(A)$$

$$= \lambda^2 - (2)\lambda + (-3)$$

$$= \lambda^2 - 2\lambda - 3$$

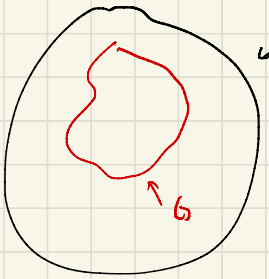
$$= (\lambda - 3)(\lambda + 1) = 0$$

$$\lambda = 3, -1$$

$$4yxz + 2xz^2 = 4xyz + 2yz^2$$

$$4xy + 2xz = 4xy + 2yz$$

$S: f(x,y,z) = 2022$



$f(x,y,z) = 2022$

$\nabla f(x,y,z) = 0$

$\nabla f(G(u,v)) = 0$

$G(u,v) = 2022$

$G(3,0) = \begin{bmatrix} 0 \\ 9 \\ 9 \end{bmatrix}$

$DG = \begin{bmatrix} v & u \\ 2u & 2v \\ 2u & -2v \end{bmatrix}$

$DG(3,0) = \begin{bmatrix} 0 & 3 \\ 6 & 0 \\ 6 & 0 \end{bmatrix}$

$(f \cdot G)(u,v) = 2022$

$Df(G(u,v)) \cdot DG(u,v) = \vec{0}$

$\begin{bmatrix} p & q & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 3 \\ 6 & 0 \\ 6 & 0 \end{bmatrix} = 0$

$6q + 6 = 0 \rightarrow q = -1$

$3p = 0 \rightarrow p = 0$

$\begin{bmatrix} p \\ q \\ 1 \end{bmatrix}$ is normal vector to surface

$\vec{a} = G(3,0) = \begin{bmatrix} 0 \\ 9 \\ 1 \end{bmatrix}$

$\nabla f(\vec{a}) \cdot (\vec{b} - \vec{x}) = 0$

$\begin{bmatrix} p \\ q \\ 1 \end{bmatrix} \cdot \begin{bmatrix} x - 0 \\ y - 9 \\ z - 9 \end{bmatrix} = \vec{0}$

$p(x-0) + q(y-9) + 1(z-9) = 0$

$0 = (z-9) + (y-9) -$

$0 = 6 - z + y + 3 -$

$z = y$