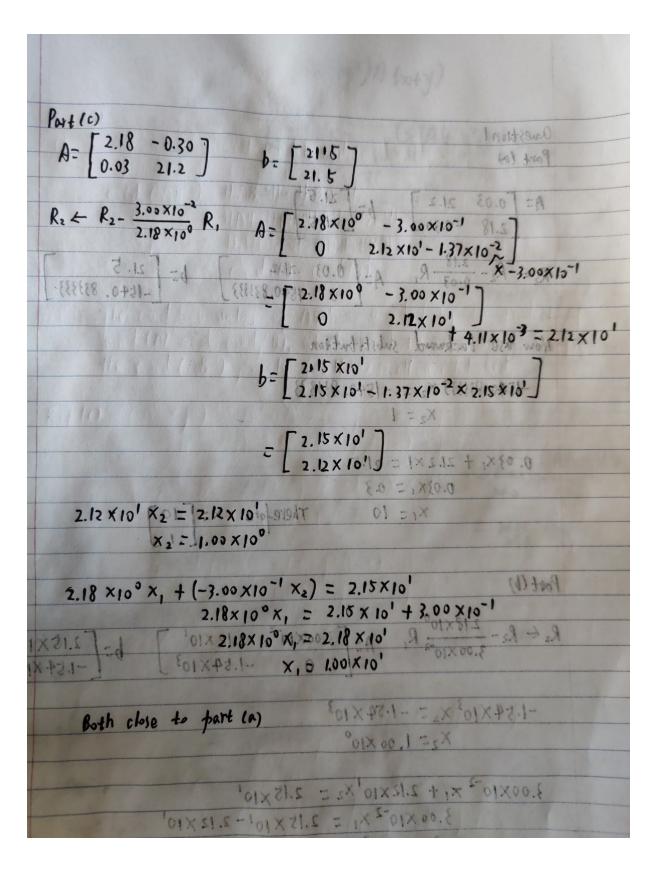
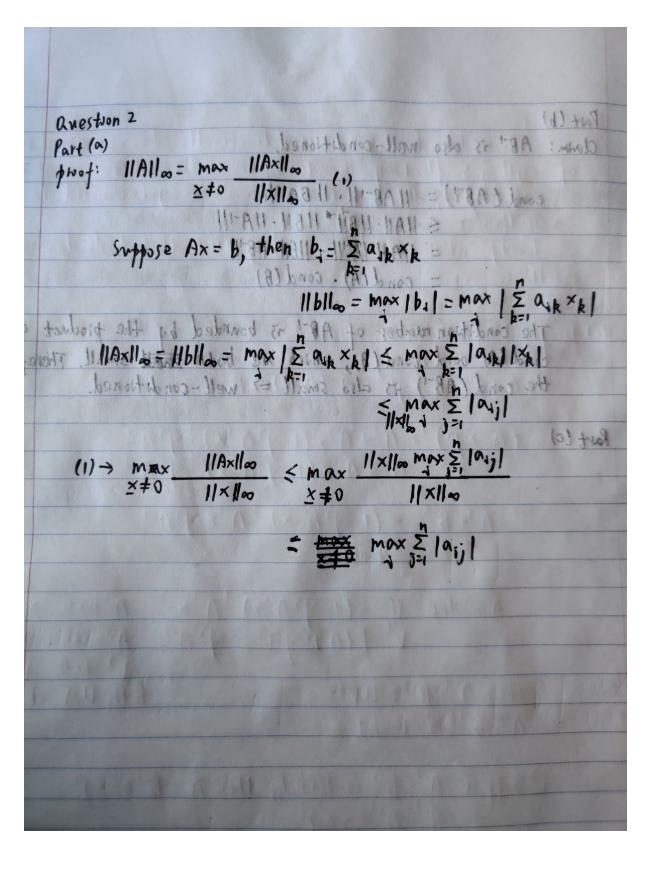
```
anestion 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Part (c)
                                 Part (a)
                                 A = \begin{bmatrix} 0.03 & 21.2 \\ 2.18 & -0.30 \end{bmatrix} \qquad b = \begin{bmatrix} 21.5 \\ 21.5 \end{bmatrix}
R_{2} \leftarrow R_{2} - \frac{2.18}{0.03} R, \quad A = \begin{bmatrix} 0.03 & 21.2 \\ 0.03 & 1.540.83333 \end{bmatrix} \quad b = \begin{bmatrix} 21.5 \\ -1540.83333 \end{bmatrix}
                           Now use backward substitution
                                      -1540.1831333 X2X78-1540. 833833
                                                                                                                                     X2 = 1
                                          0.03 x1 + 21.2 x1 = 21.5 xd.s
                                                                                                                     0.03x, = 0.3
                                                                                                                                            x,= 10 Therefole | x = [10] 101 x s | 5
          Post (b) \frac{1-01\times0.00}{01\times21.5} = \frac{1}{3.00\times10^{-2}} \times \frac{2.18\times10^{0}}{1.01\times21.5} = \frac{1}{3.00\times10^{-2}} \times \frac{2.18\times10^{0}}{1.01\times210^{-2}} \times \frac{1}{3.00\times10^{-2}} 
                                   -1.54×103 x2 = -1.54×103 (a) trad at arela Atad
                                                                                                                 X2= 1,00 X10°
                                 3.00×10-2 x1 + 2.12×10 x2 = 2.15×10'
                                                                                                                3.00 ×10-2 ×1 = 2.15 ×101-2.12 ×10'
                                                                                                                             3.00 × 10-2 ×1 = 3.00 × 10-1
                                                                                                                                                                                                          X, = 1.00 X10
```





and stand at a standard and the standar

anestion 4

amestion S (b) The reason behind these inaccurate results hies on the limitation of tython's floating point system. The olagg... in u and v
has 16 digits, this will cause the value got rounded to even
more than
in binary, which introduce rounding error that leads to inaccurate

result.

(c) proof: O suppose A-B +3 rank (x>A x>) = all x>1 then A-B = xy<sup>T</sup>

Notice A-xy<sup>T</sup> = A-(A-B) = B

(A-xy<sup>T</sup>)<sup>-1</sup> = A<sup>-1</sup> + A<sup>-1</sup> x (1-y<sup>T</sup>A<sup>-1</sup>x)<sup>-1</sup> y<sup>T</sup>A<sup>-1</sup>

B<sup>-1</sup> = A<sup>-1</sup> + A<sup>-1</sup> x (1-y<sup>T</sup>A<sup>-1</sup>x)<sup>-1</sup> y<sup>T</sup>A<sup>-1</sup>

 $A^{-1}-B^{-1}=\frac{-(1-y^{T}A^{-1}x)^{-1}A^{-1}x}{constant}$ 

U: nx1

Now let  $U = -(1 - y^{T}A^{-1}x)^{-1}A^{-1}x$  A:  $h \times n \times n \times n \times 1$   $V = [(A - y^{T}y)^{T} = y^{T}A^{-1}]$   $V = [(A - y^{T}y)^{T} = y^{T}A^{-1}]$   $V = [(A - y^{T}y)^{T} = y^{T}A^{-1}]$   $V = [(A - y^{T}y)^{T} = y^{T}A^{-1}]$ 

Then A - '- B - ' = UVT A-1- B-1 is rank 1

Both U, V are column veotor

@ Suppose A'-B'+s rank 1, then A'-B'= xyT

B'-A'=-xyT

B'-A'-xyT B = (A-'-xyT)-' B = A + Ax(1-yTAx)-'yTA

Similar to 0, with some substitution we can get A-B=UVT for some column vector U, V. A-B is rank 1

anestion 5
proof: Want to show HHT= I by definition of orthogonal matrix.

$$HH^{T} = \left(I - 2\frac{v \cdot v^{T}}{v^{T} \cdot v}\right) \left(I - 2\frac{v \cdot v^{T}}{v^{T} v}\right)^{T}$$

$$= \left(I - 2\frac{v \cdot v^{T}}{v^{T} v}\right) \left(I^{T} - 2\left(\frac{v \cdot v^{T}}{v^{T} v}\right)^{T}\right)$$

$$= \left(I - 2\frac{v \cdot v^{T}}{v^{T} v}\right) \left(I - 2\frac{v \cdot v^{T}}{v^{T} v}\right)$$

$$= I - 2\frac{v \cdot v^{T}}{v^{T} v} - 2\frac{v \cdot v^{T}}{v^{T} v} + 4\frac{v \cdot v^{T} v \cdot v^{T}}{(v^{T} v)^{2}}$$

$$= I - 4\frac{v \cdot v^{T}}{v^{T} v} + 4\frac{v \cdot v^{T}}{v^{T} v}$$

$$= I$$