MM 209 – Tutorial 1 – Batch A

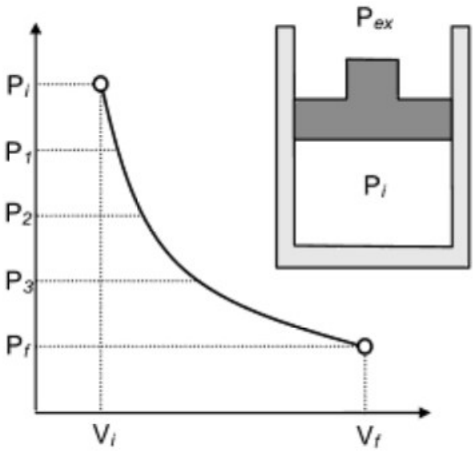
PLEASE ANSWER THESE QUESTIONS ON PAPER HANDWRITTEN, SCAN IT (NO PHOTOGRAPHS) PROPERLY AND SUBMIT THEM AS ONE PDF FILE

IN EACH PAGE CLEARLY WRITE (YOUR HAND WRITING) YOUR ROLL NUMBER, NAME AND YOUR GROUP INFORMATION (A or B) AT THE CENTRE OF PAGE (NOT AT THE TOP OR BOTTOM).

Please use the following for naming your pdf file rollnumber_tut1.pdf

1) Find the line integral $\int_{AB}(3x^2y + y)\,dx + (x^3 + x)dy$ along line AB
   a) AB is straight line between A(1,2) and B(2,5)
   b) AB is parabola $y = x^2 + 1$ from A to B
   c) Do you think the line integral is path independent? What condition the terms in the integral should satisfy for it to be path independent?

2)



The gas shown in the figure on the left expands and pushes the piston against the external pressure P_f. Determine the work done on the cylinder for the following paths (Show it schematically)

1) P_{ext} suddenly drops to P_f
2) P_{ext} drops to P1 and then to P_f
3) P_{ext} drops to P1, P2 and then to P_f
4) P_{ext} drops to P1, P2, P3 and then to P_f
5) P_{ext} drops in such a manner that it is always infinitesimally smaller than the pressure inside the cylinder.

3) Find the Isothermal compressibility and isobaric expansion coefficient for ideal gas