

Create an well documented notebook and using python solve the following, share the code using GitHub link

- 1 • Find the approximate change in the value of  $\frac{1}{x^2}$  when  $x$  changes from 2 to 100 ✓

- 2 • Rishi has a total of ₹ 590 as currency notes in the denominations of ₹ 50, ₹ 20 and ₹ 10. The ratio of the number of ₹ 50 notes and ₹ 20 notes is 3:5. If she has a total of 25 notes, how many notes of each denomination she has?

- 3 • The organizers of an essay competition decide that a winner in the competition gets a prize of ₹ 100 and a participant who does not win gets a prize of ₹ 25. The total prize money distributed is ₹ 3,000. Find the number of winners, if the total number of participants is 63. ✓

- 4 • The sum of three consecutive multiples of 11 is 363. Find these multiples. ✓

- 5 • The digits of a two-digit number differ by 3. If the digits are interchanged, and the resulting number is added to the original number, we get 143. What can be the original number? ✓

6 • Solve  $5x - 2(2x - 7) = 2(3x - 1) + \frac{7}{2}$  ✓

- 7 • Find the area of the region included between the parabola  $y^2 = x$  and the line  $x + y = 2$  and the X-axis. ✓

- 8 • A manufacturer produces three models of toys in the form of bikes say X, Y and Z . Model X takes as 10 man-hour to make per unit, Model Y takes 5 man-hour per unit and model Z takes 4 man-hour per unit. There are a total 212 man-hour available per week. Handling and marketing costs are <20, <30 and <40 per unit for models X, Y and Z respectively. The total funds available for these purposes are <920 per week. Profits per unit for models X, Y and Z are <40, <10 and <70 respectively, but at the end of the week, company get a profit of <810. Solve the system of equations by matrix method. ✓

9 • Prove that

$$\tan^{-1}\left(\frac{\cos x}{1 - \sin x}\right) = \left(\frac{\pi}{4} + \frac{x}{2}\right), x \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right).$$