**CALCULUS**

**Assignment 1: (Unit 1 and Unit 2)**

1) You are driving on a straight highway on which the speed limit is 55 mi/h. At 8:05 a.m. a police car clocks your velocity at 50 mi/h and at 8:10 a.m. a second police car posted 5 mi down the road clocks your velocity at 55 mi/h. Explain why the police have a right to charge you with a speeding violation.

2) At 11 a.m. on a certain morning the outside temperature was 76◦F. At 11 p.m. that evening it had dropped to 52◦F. Show that at some instant during this period the temperature was decreasing at the rate of 2º F/h.

3) A ball is dropped from a height of 10 m. Each time it strikes the ground it bounces vertically to a height that is 3/4 of the preceding height. Find the total distance the ball will travel if it is assumed to bounce infinitely often.

4) If a function f is represented by a power series on an interval, then the graphs of the partial sums can be used as approximations to the graph of $f$ . (a) Use a graphing utility to generate the graph of $\frac{1}{1-x}$ together with the graphs of the first four partial sums of its Maclaurin series over the interval $(-1,1)$ . (b) In general terms, where are the graphs of the partial sums the most accurate?

5) The wind-chill index is modeled by the function $W = 13.12 + 0.6215T - 11.37\upsilon^{0.16} + 0.3965T\upsilon^{0.16}$ where $T$ is temperature in $^0C$ and $\upsilon$ is the wind speed (km/h). When $T = -15\,^\circ C$ and $\upsilon = 30km/h$ by how much would you expect the apparent temperature $W$ to drop if the actual temperature decreases by $1\,^\circ C$ what if the wind speed increases by 1 km/h?

6) An international airline has a regulation that each passenger can carry a suitcase having the sum of its width, length, and height less than or equal to 129 cm. Find the dimensions of the suitcase of maximum volume that a passenger can carry under this regulation.

**Instructions:**

- Please submit your assignment (only in Assignment Sheets) on or before 06/09/2024 5PM (handwritten).
- Mention the following in the first page:
  NAME, Roll NO., Class and Division, Program, Date.
- And start the solutions from Page 2.
- The assignment which does not follow the instructions mentioned will not be considered for evaluation.