

## Math 113 Homework 1

Due: 13 October 2005 Thursday class hour for section-2

Due: 14 October 2005 Friday class hour for section-1

**Q-1)** Find a formula for the sum

$$S(n) = 1 \cdot 2 + 3 \cdot 4 + \cdots + (2n - 1)(2n),$$

where  $n \in \mathbb{N}^+$ . Prove your formula by induction.

**Q-2)** Find all  $x \in \mathbb{R}$  for which we have  $|x^2 - 7x + 11| < 1$ .

**Q-3)** Find the area bounded by  $y = |x|$  and  $y = 1 - 2x - x^2$ .

**Q-4)** Sketch and find the area bounded by the cardioid  $f(\theta) = 1 + \sin \theta$  where  $0 \leq \theta \leq 2\pi$ .

**Q-5)** Sketch the region bounded by the line  $y = 10 - x$  and the curve  $y = 9/x$ .

i) Find the area of this region. Here you may take  $\int_1^9 (1/x)dx \approx 2.2$ .

ii) Find the volume obtained by revolving this region around the x-axis.

iii) Find the volume obtained by revolving this region around the y-axis.

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