National University of Computer & Emerging Sciences, Karachi
Department of Computer Science
Assignment 2

Course: Calculus and Analytical Geometry	Course Code: MT 1003
Semester: Spring Section: BCS 1E/F/H	Instructor Name: Shahid Ashraf

Q1 Compute the following limits

(a)
$$\lim_{x\to 0}\left(\frac{1}{x\sin x}-\frac{1}{x\tan x}\right)$$

(b)
$$\lim_{x\to -\infty}\left(x-\sqrt{x^2+3x}\right)$$

(c)
$$\lim_{x\to +\infty}\left(x-\ln(x^2+3)\right)$$

Q2 Use the first derivative test to find the location of all local extrema for f (x) $= 5x^{\frac{1}{3}} - x^{\frac{5}{3}}$. Use a graphing utility to confirm your results.

Q3 For the function $f(x) = x^3 - 6x^2 + 9x + 30$, determine all intervals where f is concave up and all intervals where f is concave down. List all inflection points for f . Use a graphing utility to confirm your results.

Q4 Two airplanes are flying in the air at the same height: airplane A is flying east at 250 mi/h and airplane B is flying north at 300 mi/h. If they are both heading to the same airport, located 30 miles east of airplane A and 40 miles north of airplane B, at what rate is the distance between the airplanes changing?

Q5 Compute the left and right Riemann sums L_4 and R_4, respectively for $\sqrt{9-(x-3)^2}$ on $[0, 6]$ and compare there values