Linearization, related rates and Mean Value theorem

October 28, 2016

Problems

Problem 1. Approximate the number $(1.0002)^{50}$.

Problem 2. A lighthouse is located on a small island three (3) km off-shore from the nearest point P on a straight shoreline. Its light makes four (4) revolutions per minute. How fast is the light beam moving along the shoreline when it is shining on a point one (1) km along the shoreline from P?

Problem 3. Show that between any two zeros of the polynomial $x^6 - 3x^4 + 6x - 1$ there is always a zero of the polynomial $x^5 - 2x^3 + 1$. (Hint: Rolle's theorem.)

Problem 4. One man has to drive 20 miles from his house to work on a highway with 55 miles per hour speed limit, and in the evening he returns by the same route. One day he finished his work at 5.10 pm, and at 5.30 pm there was supposed to be a very important episode of Teenage Mutant Ninja Turtles, where the origin of Krang was supposed to be explained. The man really wanted to see this episode, and luckily he made it home right before the episode started. Next day he received a speeding ticket. Was this ticket legit?