

MA 131 Calculus I - Spring 2008

Written Homework 1

Due by Friday, February 8, 2008 at the start of lecture.

Late homework is not accepted.

An unmanned space probe is being launched to a distant planet. Ground control engineers compute that an error of size d degrees in the spacecraft's initial angle of trajectory will result in the spacecraft missing its target by $\text{err}(d) = 25(10^d - 1)$ miles.

- 1.) What is $\lim_{d \rightarrow 0} \text{err}(d)$? Does this make sense? If so, why? If not, why not?
- 2.) What is $\lim_{d \rightarrow 0.002} \text{err}(d)$? Explain the physical interpretation of this result.
- 3.) Suppose we desire that the space probe land within 0.1 mile of its target for exploration. Determine the values of d that satisfy this inequality.
- 4.) Plot $y = \text{err}(d)$ for values of $0 \leq d \leq 0.002$ to verify your analysis from part 3. You can use any means necessary to generate the plot (*i.e.* a graphing calculator, Matlab, Maple, etc.). Include the plot with your submission.