MATH 4590 – Study for exam 2

Definitions

limit of a set (in a metric space), open set, closed set (all in homework 4), definition of $\lim_{t \to a} f(t)$, differentiable function, rth order Taylor polynomial

Stuff from homework

(HW4): decide whether or not a subset of a metric space is closed and/or open or neither. Sometimes an explicit metric and subset will be given (like problems 1 and 3), other times it will be "for any metric space" (like problem 2)

(HW5): write a proof involving open sets, closed sets, and/or their complements; a problem involving the $\operatorname{dist}(A, B)$ function

(HW6): the theorem about local extrema having zero derivative, an induction proof involving calculus, absolute differentiation proof (the definition will be provided if needed)

(HW7): a problem like problem 1, a problem like number 2 (but not part b), an induction proof involving calculus, a problem about Taylor polynomials, possibly a problem like 5 but not the same thing (if that makes sense)

Theorems to know

the set complement of an open set is a closed set, the set complement of a closed set is an open set, DeMorgan laws for sets (complement of union and complement of intersection), basic calculus things (differentiable functions are continuous, product rule, chain rule, etc)

Stuff from quizzes

Quiz 4: is set open or closed?

Quiz 5: prove a limit of a quadratic function

Quiz 6: differentiation (or lack thereof) of a "strange" function like $x \sin\left(\frac{1}{x}\right)$

Other

A proof involving compactness may also be asked.