

MATH 3210 - SUMMER 2008 - ASSIGNMENT #8

CONTINUOUS FUNCTIONS ON AN INTERVAL

- (1) (a) Suppose f is continuous on \mathbb{R} (i.e. continuous at a for all a), and suppose $\lim_{x \rightarrow \infty} f(x) = -\infty$ and $\lim_{x \rightarrow -\infty} f(x) = \infty$. Prove that there is a $c \in \mathbb{R}$ such that $f(c) = 0$.
- (b) (bonus) If f is as above, prove that for any d there is a c such that $f(c) = d$ (i.e. f maps onto \mathbb{R}).
- (2) Do problems 2,4,5,6,7 on page 75.
- (3) Prove that there exists a solution to the equation: $5 \sin(x) - \cos(x) = 1$