Homework 10: The Intermediate Value Theorem

1. §5.3, #7, 9, 10. For all three problems, you should use the Intermediate Value Theorem. Problem 7 is the one-dimensional Brouwer Fixed Point Theorem.

2. Let f be continuous on $[0, 1]$ with $f(0) = f(1)$. Prove that there exists $c \in [0, \frac{1}{2}]$ such that $f(c) = f(c + \frac{1}{2})$.

3. Prove that there exists a real number x such that

$$x^{177} + \frac{165}{1 + x^8 + \sin^2 x} = 125.$$