

Brief answer to selected problems in HW02

1. No. For example. $\lim_{x \rightarrow 1} f(x) = 1$. Yet, for any $\delta > 0$, one can take $\epsilon_0 = \delta/4$ and $x_0 = 1 + \delta/4$ satisfying the definition.

2. Section 2.4: Problem 26 (answer = 2), 34 (answer = 1), 42 (answer = 1).

3. Section 2.5:

Problem 64: If f is discontinuous at $g(0)$, $f(g(x))$ may still be discontinuous at $x = 0$. No contradiction.

Problem 67: The function $g(x) = f(x) - x$ satisfies $g(0) \cdot g(1) \leq 0$. If the equality holds, then c is found. Otherwise, apply the Intermediate Value Theorem to $g(x)$ on $[0, 1]$.

Problem 77: The function $f(x) = \cos(x) - x$ satisfies $f(0) \cdot f(1) < 0$.

4. Section 2.6:

Problem 92: If $B > 0$, take $\delta = 1/\sqrt{B}$ will do. If $B \leq 0$, take δ to be any positive real number (for example $\delta = 1$) will do.

Problem 93:

(a): change ' $x_0 < x < x_0 + \delta$ ' to ' $x_0 - \delta < x < x_0$ '.

(b): change ' $f(x) > B$ ' to ' $f(x) < B$ ' (or ' $f(x) < -B$ ').

(c): apply both changes in (a) and (b).